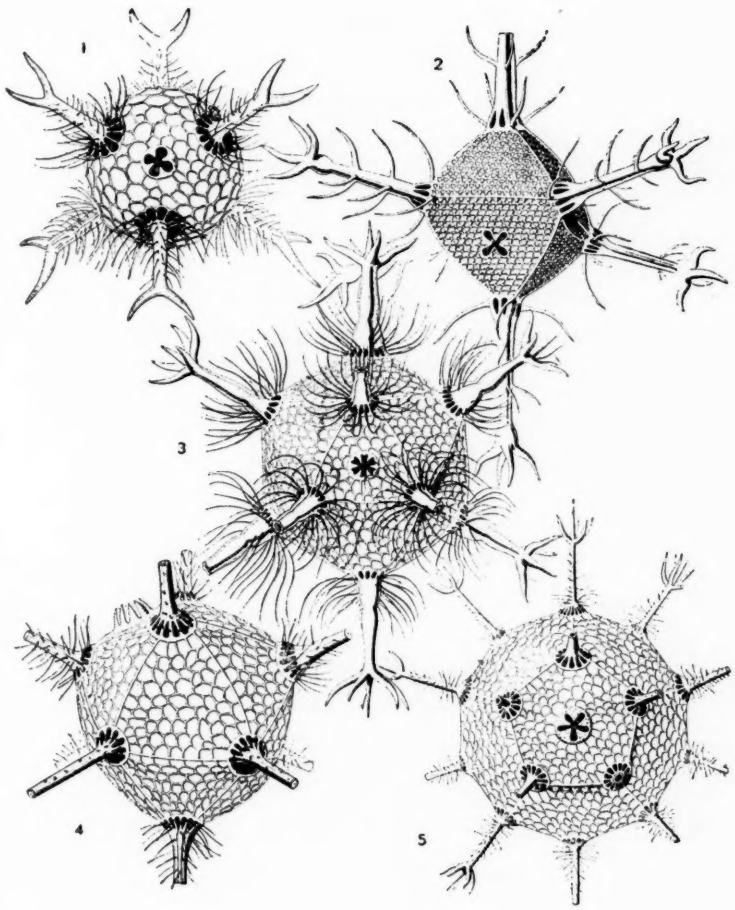
MAIN CURRENTS

IN MODERN THOUGHT



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VOL. 9 NO. 2

MAIN CURRENTS IN MODERN THOUGHT

A co-operative journal to promote the free association of those working toward the integration of all knowledge through the study of the whole of things, Nature, Man, and Society, assuming the universe to be one, dependable, intelligible, harmonious.

VOL. 9 No. 2 (Issued SEPTEMBER, 1952) $3 A YEAR, PUBLISHED QUARTERLY

The Journal of the Foundation for Integrated Education, 246 East 46th St., New York 17, N. Y.

"Ah, but a man's reach should exceed his grasp, or what's a heaven for?" — BROWNING

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The cover design is a page from Haeckel's *Challenger Monograph* which shows the skeletons of several radiolarians. Numbers 2, 3, and 5 are octahedron, icosahedron, and dodecahedron in astonishingly regular form; no. 4 seems to have a lower symmetry. For further discussion see, under Reviews, the comments on *Symmetry*, by Hermann Weyl.

AIMS OF THE FOUNDATION FOR INTEGRATED EDUCATION

The Foundation is incorporated under the laws of the State of New York as a non-profit educational organization. Contributions are tax deductible.

The corporate statement of Aims declares that the Foundation has been established:

1. To collect, create, and distribute authoritative materials which will encourage the development of unified overall concepts in education; to improve the balance of relationships between the physical sciences and the social sciences; to inquire into the phenomena of purposive activity in nature, man and the universe.

2. To assist teachers to understand and use such materials, and to develop an active, realistic, comprehensive philosophy which will communicate to their students the unity, coherence, and beauty of the world in which we live.

3. To remedy, solely by such educative measures, the conceptual and hence the ethical, social, economic, and political breakdown of our times, looking to a peaceful world order.

The members, associates, and staff of the Foundation realize that the progressive discovery of unifying over-all concepts concerning man and the universe is not a task to be performed successfully in isolation from the historical, social, economic, and political context of our times, nor in terms of application less than global.

The work of the Foundation is wholly educational, yet is referred constantly to the contemporary scene in all its aspects, no less than to the total available wealth of human experience and knowledge.

MAIN CURRENTS IN MODERN THOUGHT is published quarterly to call attention to significant contributions to learning currently being made by leading workers in the multiple fields into which knowledge has come to be classified. It relates these advances to each other and to the classical and contemporary views of Eastern, European and American thinkers. It is designed to save time for the reader by providing a vantage-ground from which the whole world of knowledge may be surveyed and kept in proportion as it moves toward integration. Its editors assume that the principles of art, the universals of philosophy, the laws of Nature and Man as formulated by science, and the truths of comparative religion, can be orchestrated into a harmonic, meaningful, ethical body of teachings which can and should be made the central core of curricular study in the educative process at all levels of development. In condensing text, square brackets [ ] indicate editorial interpolation. Three dots . . . in the text indicates a word, phrase or passage omitted in the interest of brevity or clarity. Other usages are standard. $3.00 a year. Foreign $3.50. Contributors to MAIN CURRENTS enjoy full liberty of opinion and expression in these pages. *Copyright 1952, by F. L. Kunz, Port Chester, New York, to whom all communications regarding MAIN CURRENTS IN MODERN THOUGHT should be addressed.* *Entered as second class matter April 13th, 1946, at the post office at Port Chester, New York, under the Act of March 3rd, 1879.*

THE FOUNDATION FOR INTEGRATED EDUCATION

NEWS AND NOTES

MR. KUNZ'S TOUR

It proved possible for Mr. Kunz to accept invitations from the twenty-six colleges and universities listed below on a tour westward and up the Coast during April, May, and June, and again eastward in August. In most cases conferences were arranged by and with curriculum committees and administrative officers (frequently the president or administrative dean). The history and program generally of the Foundation for Integrated Education were outlined and discussed, and the special purposes of the Foundation's Sixth Workshop were examined. Visits were made in this order: University of Cincinnati, Illinois College (the meeting of the Federation of Illinois Colleges), Washington University, University of Kansas, University of Oklahoma, University of New Mexico, New Mexico Highlands University, Arizona State University, University of Southern California, Occidental College, Stanford University, Mills College, University of California, San Francisco State College, University of Oregon, Oregon College of Education, Oregon State College, Reed College, University of Washington, Western Washington State College, University of British Columbia, Central Washington College of Education, University of Montana, Montana State College, University of Denver, University of Colorado. Luncheon club addresses and a variety of other auxiliary occasions and personal visits with a host of friends of the Foundation at many points on tour may for the most part be omitted from the notes, but some remarks on certain constantly recurring features of discussion will be found below.

A luncheon party at the University of Washington was arranged by Professor Max Savelle and his colleagues in the University's General Education program. President Harold P. Everest presided, and Mr. Kunz (introduced by Professor Stuart C. Dodd) shared a program of brief addresses and discussion with Vice-Chancellor B. L. Hallward of Nottingham University. Concern over disintegration in education in England was made clear, and the world-wide recognition of the need for suitable improvements in educational programs was most evident.

The intimate connection between integrative education and ethical, moral, and social problems arose very pointedly in conversations with Chancellor Charles D. Byrne of Oregon, at Stanford University, University of Montana, and elsewhere, in fact, nearly invariably. At the University of Colorado the directors of the general education studies have given unusually exact attention to the difference in effect upon ethics of an integrative as contrasted with a general education program. It was unusually heartening to see how clear and practical is the thinking and how resolute is the intent to make headway with a solution.

Invitations to a few campuses had to be reluctantly declined, owing mostly to exigencies of a crowded itinerary. It was particularly unfortunate that a firm engagement to visit at Washington State (and with a friend on the faculty at the University of Idaho, Moscow, Idaho) had to be broken, for their representatives at the Corvallis Workshop made clear the desire of their general education teachers to establish common cause with the Foundation. Conferences were possible, however, with Professor Winslow Hatch, and cooperation is being worked out, as it has been with Oregon State, and other major institutions of the Northwest.

In retrospect, the Workshop and the campus vists of 1952 indicate that from this point forward a steady cooperative effort at the actual process of conversion to an integrative program is certain.

COOPERATIVE PROGRAM

Since the publication of the last issue of MAIN CURRENTS, administrators and faculty members in more than 200 colleges throughout the country have been apprized of the Foundation's Cooperative Program on the Frontier of Knowledge, and F. L. Kunz's tour to the West Coast provided many opportunities for discussion of this program on a number of campuses. The idea central to the program has been well received and the need for some integrative strengthening of the general education program has been almost universally acknowledged. The Foundation is gratified with the response of faculty committees and college administrative bodies that have the Cooperative Program under advisement. The tenor indicates that the number of additional subscribers to the program will increase sharply with the opening of the new academic year.

One of the universities subscribing to the program has not only instituted a study of integrative concepts in its faculty curriculum committee, but has also presented the material to a committee of business and professional people in its city to study the implications of integration in adult education and civic life. This parallels the development of courses on "The Frontier of Knowledge" as an adult educational project under an independent

committee in Philadelphia, and the indications in two other large cities that similar projects will be undertaken.

Advantage of these opportunities is being taken by the Foundation to enrich its program and to establish integrative concepts from more and more disciplines as scholars are found through these various ventures to do the necessary work. All subscribers to the Cooperative Program will be afforded the benefits of the resources thus uncovered on an ever widening frontier. The Foundation is rapidly gaining experience and acquiring a technique which will make future developments ever more effective. A newsletter will be forthcoming shortly sharing such experience as has already accrued to all subscribers and to those faculties which have the program under consideration.

NEW YORK UNIVERSITY COURSE

The course, "The Frontier of Knowledge: Integrative Concepts in Science, Philosophy, and Education," which was given last winter by New York University in association with the Foundation, will be repeated during the school year 1952-53. So far as content and personnel, the course will be substantially the same as last year, with, however, changes in a few lecturers because of the unavailability of certain lecturers this year. Some modifications in the order of lectures and in the titles have also been made in the light of experience last year. Henry Margenau, Higgins Professor of Physics and Natural Philosophy, Yale, is chairman.

Following is the list of lectures for the coming year:

FIRST TERM

September 23 — The Need for Integration of Knowledge. F. L. Kunz, Foundation for Integrated Education. Comments by George Axtelle, Professor of Education, New York University; William Gruen, Adjunct Assistant Professor of Philosophy, New York University; and Henry Margenau.

September 30 — Mechanism and Space-Time. Henry Margenau.

October 7 — The Breakdown of Mechanism; The World of Quanta. Henry Margenau.

October 14 — The Nature of Mathematics. Richard Courant, Professor of Mathematics, New York University.

October 21 — The Method of Empirical Science. Henry Margenau.

October 28 — Directives Implicit in the Structure of the Earth. Kirtley F. Mather, Professor of Geology, Harvard University.

November 11 — Stars and Nebulae (Illustrated). Harlow Shapley, Director, Harvard Observatory.

November 18 — The Chemistry of Living Matter. J. Kirkwood, Sterling Professor of Chemistry, Yale University.

November 25 — The Living Mechanism. John T. Bonner, Associate Professor of Biology, Princeton University.

December 2 — Statistics and the Modern World. Harold Gullicksen, Research Advisor, Educational Testing Service, Princeton, N.J.

December 9 — Environmental Effects on Living Organisms. Paul B. Sears, Professor of Botany, Yale University.

December 16 — Heredity and Environment. Leslie C. Dunn, Professor of Zoology, Columbia University.

January 6 — Evolution. M. F. Ashley Montagu, Chairman, Department of Anthropology, Rutgers University.

January 13 — Cell and Psyche. Edmund W. Sinnott, Dean, Graduate School, Yale University.

January 20 — Term Summary. William Gruen.

SECOND TERM

February 3 — Formal and Operational Procedures in Science (Cosmology and Metaphysics). Henry Margenau.

February 10 — The Nature of Culture. (Lecturer to be announced.)

February 17 — The Nature of Aesthetics. George Boas, Professor of Philosophy, Johns Hopkins University.

February 24 — Signs, Personality, and Society. Charles Morris, Lecturer in Philosophy, University of Chicago.

March 3 — The Idea of Normality in Human Behavior. A. H. Maslow, Professor of Psychology, Brandeis University.

March 10 — The Nature of Man. Gardner Murphy, Professor of Psychology, College of the City of New York.

March 17 — The Nature of Learning. Mark May, Director, Institute of Human Relations, Yale University.

March 24 — The Theory of Value. C. I. Lewis, Professor of Philosophy, Harvard University.

April 7 — Democracy and Social Action. Sidney Hook, Professor of Philosophy, New York University.

April 14 — Philosophy of History. F. S. C. Northrop, Sterling Professor of Law and Natural Philosophy, Yale University.

April 21 — Education and American Civilization. John Brubacher, Professor of Education, Yale University.

April 28 — Theory of Education. Theodore Brameld, Professor of Education, New York University.

May 5 — Values and Facts in Education. (Lecturer to be announced.)

May 12 — Education and Cosmic Perspectives. Louise Antz, Associate Professor of Education, New York University.

May 19 — Summary. Henry Margenau.

PHILADELPHIA COURSE

A course in integrative concepts, similar to the original offering at New York University in 1951-52, will be offered by the Foundation for Integrated Education in Philadelphia during the academic year 1952-53.

The inception of the new venture goes back to the 1951 Durham workshop, which was attended by Mr. Samuel Evans of the Cooperative Educational Extension Service of Philadelphia and Mrs. Esther King, Vice-President of the Philadelphia Ethical Society. Mr. Evans commuted regularly from Philadelphia to the New York University

course last season and Mrs. King also attended several sessions. In April, the Philadelphia Ethical Society arranged a meeting to discuss integrated education which was attended by about 175 people and was addressed by Professor Henry Margenau, Mr. F. L. Kunz, and Mr. Harvey W. Culp, with Professor William Seifriz of the University of Pennsylvania acting as moderator. Out of this meeting grew an enthusiastic committee which has become formally known as the Committee for Integrated Education in Philadelphia with headquarters at 1906 South Rittenhouse Square, Philadelphia, where the course will be conducted Wednesdays, September 24, 1952 to May 20, 1953.

The Foundation will conduct the course in a style similar in every respect to the successful venture at New York University last year. The same pattern of lecture-discussions will be maintained and the course will also consist of the same three phases: (1) a development of the central ideas in present-day physical, biological, psychological, and anthropological sciences; (2) an examination of modern educational philosophy and practice; (3) a critical estimate of the educational uses made, and not made, of certain basic scientific ideas.

Many of the lecturers in the New York University courses will appear in the Philadelphia course. They will be joined by specialists recruited from Bryn Mawr, Swarthmore, The University of Pennsylvania, LaFayette, and Princeton Universities.

The experience gained in the original course gives guidance in thus drawing upon the resources of leading scholars from the campuses of the neighborhood.

The scope of the Philadelphia course will be broadened by the addition of material on the following subjects: atomic and molecular structure, crystallography, paleontology, Gestalt psychology, psychosomatics, Oriental thought, aesthetics, and social physics.

This extension of the Foundation's educational program is the first of many local adaptations to adult education and graduate audiences in many cities. It is a natural outgrowth of the Foundation's Cooperative Program on the Frontier of Knowledge in that it affords opportunities to demonstrate the integrative effect of general education, when such study is rested upon its conceptual bases. The development of many local courses will also inevitably demonstrate over the country that integrative concepts can be developed and presented, by the cooperative efforts of specialists on many campuses and in many cities, and that integrated education is not the special province or skill of any one select group. This beneficial distribution of the new impulse can be achieved without lowering of standards, so long as the central focus of conceptualizing and the simple methodology which has been developed are adhered to.

It is the sincere hope of the officers of the Foundation that many more communities and campuses will follow the lead given by the Philadelphia committee.

The development of an outline of the basic concepts in biology has been essayed from time to time, and reported in MAIN CURRENTS (Vol. 4, Nos. 3 and 4). In the vast diversity of appearance and behavior of organisms are concealed many structural and physiological relationships that are the bases of systems of classification and fields of specialization.

It is now proposed to set up, as a project, a systematic and ever enlarging outline of the basic concepts in biology, as a specific aid in the orientation of integrative studies in this field. The material will be drawn from all aspects of the field, including observations and experimentation, and the mature judgments of experienced naturalists will be particularly capitalized upon. Special attention will also be given to the current rising interest in morphology and morphogenesis.

It is hoped that the outline and the related studies will present the fundamentals of biology in a clear, meaningful, and comprehensive manner.

Dr. Ruth Lofgren, Professor of Bacteriology, University of Michigan, has kindly agreed to foster this undertaking and work upon it with senior scholars and with source readers.

Dr. Kirtley F. Mather, Harvard, President of the Foundation for Integrated Education, has just returned from a tour of Europe and the Middle East. A letter received from him during the trip reads in part as follows:

My trip thus far has proceeded according to schedule. The 10 days in Egypt were especially interesting because of the bloodless revolution that occurred while we were there. In each of the countries — Egypt, Lebanon, Syria, Jordan, Israel and Greece — I gave particular attention to the status of education. In each there is an impressive, new desire to improve greatly the efficiency of the educational systems. There is considerable interest in the trend toward more effective general education of the integrative type, but most attention is being paid to training along scientific, medical, and engineering lines. Perhaps by the time we in America have successfully solved some of the problems with which the Foundation is grappling, the countries I have just visited will be ready to profit by our example. At the moment, however, the contrast between their educational aims and ours is very notable. That of course is all the more reason why the Foundation should blaze new trails in America where the opportunity is so much greater than in the critical area I have just visited. And believe me it *is* a critical area. I had the feeling that I was talking with people who were striking matches in a powder factory.

The Staten Island Institute of Arts and Sciences, which maintains a library and museum in St. George, Staten Island, also offers the people of this borough of New York City several series of lectures on natural history and cultural subjects during the winter months.

Through the director, Dr. James Whitehead, arrangements have been made to present a series of three lectures during the coming winter in the field of the physical sciences, the biological sciences, and philosophy, selected from "The Frontier of Knowledge" course sponsored by the Foundation for Integrated Education last year and this at New York University, and now running also in Philadelphia. Definite dates for the Staten Island lectures will shortly be announced.

Through the good offices of Mr. Werner Albrecht of Copenhagen, Denmark, the Foundation had in May a display in Copenhagen of its literature and publications in an exhibition of literature covering all aspects of human relations and touching on "cultural crises" and "roads to agreement." The display was closely linked with a working conference on "productivity in the light of new methods and criteria from the social sciences, management and organization, cultural, and other related fields." This same exhibit and the materials on display were also during the summer brought by Mr. Albrecht to the attention of the "Scandinavian Summer University" in Oslo, Norway, which was addressed to the subject, "Man and Environment."

REPORT ON THE CORVALLIS WORKSHOP

The Sixth Workshop of the Foundation took place in June at Oregon State College, Corvallis. Individuals or deputations were in attendance from the undernoted institutions: Yale University, University of Michigan, University of Oregon, University of Oregon Dental School, Occidental College, Oregon State College (see below), University of Washington, University of California, Whittier College, State College of Washington, Davis College, Vallejo College, Stanford University. An unfortunate brief illness prevented Dr. George Lundberg's attendance, but the Workshop had the full benefit of the distinguished presence and decisive help of Professor Stuart C. Dodd, Director of the Institute of Public Opinion, University of Washington, and the main purpose of the Workshop could be thus attained. An unforeseen accident made it impossible for Dean Schiller Scroggs of Oklahoma A. and M. College to be on hand.

The object of the Sixth Workshop was to examine closely the nature of exact science, and scientific method more generally, and to inquire how far and on what terms these apply in social studies. The relation of deductive-exact and other scientific process to arts and humanities generally has long been a concern of the Foundation, and this interest is reflected in the changes made in the New York University course, the Frontier of Knowledge, and will be developed in the new Philadelphia offering of that course. But at Corvallis the concentration was upon the two ends of the spectrum of organized knowledge, raising the question as to how we stand in respect to the conceptual structuring in intermediate fields (especially biology and psychology between physics and human society).

Besides the distinguished contributions of Professor Margenau and Professor Dodd, set discussions were conducted by Dr. John Hamaker (Whittier College), Dr. Charles B. Friday (Oregon State), Dr. Ruth Lofgren (University of Michigan), and the program extended into a lively canvass of the practical problems involved in the conversion of general into integrative education. In these latter discussions, Dr. Vernon Bollman, Occidental College; Dr. R. J. Rempel, State College of Washington; and Dr. Robert J. Wert, Stanford, took particularly active part.

A heartening feature of the Corvallis meeting was the response of the faculties and executives of Oregon State College. A strong representation took part in the program, and President Strand and his colleagues did much more than offer an address of welcome and maintain cordial hospitality. The college authorities went far beyond the original provisions for accommodations and facilities, and made the occasion their own cause, in every respect.

Happily and wisely, President Strand and Dean Lemon were so good as to select Mr. E. D. Duryea to cooperate with the Foundation in the preparation for the workshop. Our effectiveness in making contact with key figures in the Oregon State College faculty is due to Mr. Duryea's perception of our needs and unremitting helpfulness. It also ensured the sympathetic help of Dr. Delmer Goode, whose mature experience and insight proved invaluable.

Representative passages of Workshop discourses and discussions will be found in subsequent pages of this volume of MAIN CURRENTS.

Following are excerpts from a report of the conference by Dr. Michael Fell, Department of Mathematics, University of California, Berkeley.

Dr. Fell wrote this report for his own satisfaction and for fellow teachers at the University of British Columbia:

The topics covered in discussion during the four days were rich in variety, as befitted the variety of talent among the participants. Most of them may be classified under two related heads: (1) Methodology and concepts common to the different sciences; (2) the organization of college courses in which different branches of knowledge could be combined in a single unified view, the so-called integrative courses.

The proceedings of the first two days fell largely under the first head. Dr. Margenau began the conference with a discussion of scientific method. There are, he said, two stages in the development of any science, the descriptive or correlational, and the exact or deductive stage. In the correlational stage, we are content to describe the phenomena and to formulate correlations between phenomena. Thus, the average historian considers it his primary duty to establish *what* happened, rather than to seek deep underlying causes. Again, botany is largely a descriptive science. Describe a leaf, and the botanist will describe to you the fruit of the plant having that leaf; here we are correlating one observed entity, the leaf, with another, the fruit. Now the facts of history, the leaf, and the fruit are directly observed things. We shall refer to the class of all such directly observed things as the P-plane, or the plane of direct sense-perception (omitting all reference to the thorny philosophical problems involved in this definition).

In this terminology, a purely descriptive science is one which confines itself to recording P-plane events and their associations and correlations. Now no science can remain purely descriptive forever. The question must arise, "Why do these correlations exist? What deeper truths do they reflect?" So we seek general principles, such as the law of gravitation in physics or the principle of evolution in biology, from which the correlations found among P-plane events can be deduced as special cases. When this search has been successful, our science has become an exact or deductive science. Notice now that these general principles are not themselves entities on the P-plane (nobody has ever seen, heard, touched, smelled or tasted the law of gravitation!). We call the class of all such principles and concepts the C-field, or the field of (mental) constructs. The constructs, or concepts, of the C-field stand, as it were, behind the P-plane; and it is only through them that the separate P-plane events become unified and intelligible.

Besides the P-plane and C-field, there is another rather obvious ingredient of every exact science, namely the connections between these two called the rules of correspondence. In the formulation of the law of gravitation, for example, we use the concept of the distance between two points. If the law is to apply to P-plane experience, there must be some experimental procedure for finding out what the distance between two P-plane objects really is. One such procedure, of course, would be to take a ruler of unit length and see how many times it must be laid end to end with itself to reach from one of the objects to the other. Such a procedure for passing from P-plane experience to the concept of length is called an operational definition of length. Such operational definitions of the basic quantities involved constitute the rules of correspondence.

The ingredients of an exact science then are threefold — the P-plane experience, the C-field constructs, and the rules of correspondence between these two. Now when we come to try to understand a given area of P-plane experience, several different constructs may present themselves as possible alternatives. How do we decide between them? According to Dr. Margenau, there are two distinct kinds of criteria. First, there must be empirical confirmation. That is to say, if a set of constructs is to be satisfactory, then, using the logical relations between these constructs as well as the rules of correspondence tying them to the P-plane, one must be able to predict correctly new P-plane experience. This requirement of prediction is the touchstone of the scientific method. In addition to empirical confirmation, however, there are metaphysical requirements (so called because they are not dictated by P-plane experience) which we impose on our constructs. The essence of these requirements is that the constructs should be as simple as possible and should unify as large an area of experience as possible (see *The Nature of Physical Reality* by H. Margenau).

Such is the nature of exact science. Many believe that all intellectual disciplines can become exact sciences in the above sense. Of all the exact sciences, physics is at present the most highly developed. In the presence of a phenomenon, no matter how thoroughly described, which has no theory to explain it, the physicist feels uncomfortable; he searches for a theory. This contrasts with the attitude of many historians who look askance at the desire to find a theory to explain the recurrent patterns of history. This is an example of insulation between different fields of knowledge, which will no doubt break down as historians such as Spengler, Toynbee, and others increasingly seek for unifying principles.

Can the sciences dealing with man himself be made exact? It was the contribution of Dr. Dodd to show that this is actually happening in sociology. We cannot even summarize his talks, in which he revealed the power of the scientific method in the field of human behavior. But we may mention that, just as the telescope and microscope are the indispensable tools of the astronomer and biologist respectively, so the sociologist has his fundamental tool, which Dr. Dodd calls the "demoscope," not

indeed a physical tool, but an organizational apparatus for obtaining information about the variables of a society by polling random samples of a population. Just as physics is constructed on the three fundamental dimensions of length, time, and mass, sociology has, according to Dr. Dodd its own fundamental dimensions, which include human activities and human values as well as those of physics. Modern sociology has also its fundadental laws for the interaction of human beings, one of them being analogous in form to the law of gravitation (see *Dimensions of Society* and *Systematic Social Science* by S. C. Dodd).

A few words may be interesting here on similarities between physical and social sciences, which were brought to the notice of the conference. First, their common statistical character. The physicist cannot in general predict the outcome of an individual experiment on a single electron; rather, his predictions concern collections of many elementary particles. Similarly, the sociologist does not attempt to predict the behavior of an individual. Only situations involving many human beings, in which individual fluctuations have been cancelled out, are amenable to his methods. Economics, too, is becoming increasingly concerned with statistical ensembles rather than with individuals; this was pointed out in a paper by Dr. Charles B. Friday of the Economics Department of Oregon State College.

So much for the methodology of the sciences. With it the various sciences build up their different systems of constructs for ordering their respective fields. One may now seek analogies and formal relations between the theoretical structures of different fields, in the hope that such relations might point the way to an underlying unity. Dr. John Hamaker, Whittier College, gave a possible example of such an analogy. He explained the physical notion of resonance, and pointed out the analogy between the tuning of a radio to receive different frequencies — a resonance phenomenon — and the alteration in the receptivity of the mind to different kinds of (let us say) music when the mood of the mind alters. He also referred to the resonance bond in chemistry. Here the resonance aspect of the phenomenon expresses the fact that the state of the molecule can no longer be considered as a mere conjunction of the states of its component atoms. In other words, the whole is something more than the sum of its parts.

It was natural that at a conference on integration the question should be raised whether science can answer ethical questions, questions about what *ought* to be. It is sometimes said that the dangers to civilization from a highly developed physical science will only be averted through an equal development of the social sciences; such a statement would imply that the social sciences have an ethical content. But, as in the physical sciences, so in the social sciences the power resulting from knowledge can be used either for good or evil; it can be used for the unscrupulous manipulation of populations by scientifically devised propaganda, as well as for the well-being of man. Ethics, then, is not to be found within the content of present science, physical or social. It was therefore fitting that Dr. Margenau spoke on the problem of setting up a scientific ethics.

According to Dr. Margenau, it is possible for ethics to become an exact science, with a methodology similar to that of the other exact sciences. In brief, the elements of an ethical science would be as follows: As the fundamental postulates of an ethical science we have an ethical code (for example, the decalogue). Just as in an exact science we deduce from the general principles special theorems applicable to special cases, so there will be a part of ethical science devoted to establishing what are the consequences of the ethical code in application to special situations; in Catholic theology this part is known as exegesis or casuistry. Now what corresponds to verification or prediction in the exact sciences? To obtain ethical verification, we must have two things. First, there must be a commitment on the part of a large society of men and women to live in accordance with an agreed ethical code. If this commitment exists, we then observe for a time the fortunes of this society, to see whether the ethical code is "successful" or not. But what is meant by "successful"? What is a "desirable" state of society? Here we need a new element, a principle of verification, which formulates what we consider the most desirable state of society. If such a principle of verification is accepted, we say that an ethical code is verified in so far as a society committed to it attains, on the average, to the desirable state formulated in it. For example, our culture is predominantly committed to the decalogue as an ethical code, and its principle of verification is largely hedonism, the greatest pleasure for the greatest number.

In an interesting talk on Hindu philosophy, Mr. Kunz pointed out, in refutation of those who regard Hindu thought as entirely world-denying, that the Hindus had a highly developed scientific philosophy devoted to logic and atomistics, the Nyaya-Vaishesika (cf. *Hindu Realism*, by J. C. Chatterji). In their educational system, they considered this as a groundwork for subsequent studies, but only as a groundwork. The next stage, called Yoga-Sankhya, called for intense discipline of mind and emotion, through which the student achieved an insight in which all existence is reduced to two categories, Prakriti (Nature) and Purusha (Consciousness). Mr. Kunz emphasized that, in the Hindu view, pursuing the truth means *living* the truth, leaving no duality of purpose in the life of the seeker. Traditional Indian thought, unlike Western thought, has never glorified the separation between religion and philosophy, or between heart and intellect. To my mind, it is

this harmony between thinking and living, found among Indian philosophers, which led more than one person at the conference to express the view that Western seekers of unity have much to learn from the philosophical disciplines of the East.

The second group of discussions dealt with the question of how to embody the ideal of the unity of knowledge in practical form in the University curriculum. Some measures could be immediately taken to broaden existing courses in this direction. References to history add vitality of color to every type of course. Philosophical issues arise at every turn in the humanities and theoretical sciences. Instructors should not shirk these because of the added work they involve. But the general opinion was that merely to embellish existing courses is not enough. Right at the freshman level there should be integrative general courses, each one presenting the leading ideas, the key concepts, of a whole group of disciplines. As pointed out by Dr. Robert J. Wert, the movement for integrative courses in our universities is not new and it has received much impetus since the war.

Dr. P. J. Rempel, who has been in charge of the general education program at Washington State College, Pullman, brought out some of the implications and pitfalls of integrative courses.

What are the dangers and the requirements for success in an integrative course? In Dr. Rempel's institution, the integrative courses are four in number: in the physical sciences, the biological sciences, the social sciences, and the humanities; and they are given at the freshman level. The first requirement for success in any of these is that the instructors teaching it be emotionally involved in the course, that they should be real enthusiasts over it, as Dr. Rempel put it. Take, for example, the course in the physical sciences. It will cover key concepts from mathematics, physics, chemistry, and geology, each of these being dealt with by a scholar from that field. In Dr. Rempel's university, the mathematician, physicist, chemist, and geologist assigned to the course formed a committee which met once a week for a year or more before the beginning of the course, to plan it. They themselves at the start were probably not aware of how the integration of these fields could be carried out. But through persistent and enthusiastic working together they evolved a plan for the course. And it was not only the bare academic discussion that was necessary. Through continued association there grew up a friendship and trust among these men which broke down the specialist's natural resistance to leaving his own domain, where he is secure, and entering another field where his ignorance will come to light. Thus the course itself is preceded by the integration of the specialists among themselves! Then, when the course is being given, the first necessity is for the student, too, to be emotionally involved in it. For, after all, in the long run it is the student who must do his own integrating. To this end it is very good if laboratory work can accompany the courses in the sciences, in which the student as far as possible discovers the principles for himself. Also, it is very important that the classes should not be too big.

What are the dangers to guard against in planning such a course? The chief danger is simply stated — lack of enthusiasm in the instructors. Too often such courses, once instituted, are assigned to instructors who regard them merely as chores, taking time away from the serious business of research. When this happens the course easily degenerates into a mere survey course in several fields. It is unfortunately a common attitude among specialists to regard specialized research as the only path to promotion, and to look askance at a colleague who goes outside his own field; this attitude is a stumbling-block toward integration in general and integrative courses in particular. Against this it may be said that research is the fountain of intellectual vitality, and that teaching suffers when teachers neglect to exercise their minds in it. This is very true. But research consists not only in the accumulation of new facts, but also in the struggle for new syntheses of facts. Research is simply the struggle to resolve a "felt difficulty," however broad the latter may be. We do admit the danger of vague and fuzzy thinking when a person occupies himself exclusively with generalities. It is healthy, therefore, to train oneself in the disciplines of some exact science. But the instructor who is to teach an integrative course must above all else be one who has himself struggled to achieve an integrated view of the whole of existence.

Many other questions will suggest themselves here. In these freshman integration courses we have a start; but why stop here? Why not continue the integration courses through the higher years? Why not, in fact, integrate the different integrative courses themselves? These questions offer possibilities for great future development.

Another participant in the Workshop, Mr. David Ulmer, McCall, Idaho, wrote: "I found the workshop one of the most interesting weeks I have ever experienced. I heard enough to keep me thinking for months and learned enough to change my approach to almost any task that may confront me in the future years." Mr. Ulmer is at present a medical student.

For the present, in respect to individual contributions, we have space in this issue only for a typical impromptu item by Professor Vernon Bollman (Occidental College). It was notable that independent experience is showing that conceptual treatment is a strengthening and not a weakening influence on the specialist student, a point which can scarcely be stressed too much.

AN EXPERIENCE IN INTEGRATION*

Vernon L. Bollman

Occidental College

A Professor of Physics Reports On the Success of a New Curriculum

Professor Henry Margenau has pointed out the value of simplification of the material in a field of knowledge, to the framework of basic concepts or *constructs,* as an essential step in the process of integration. With this fundamental approach, the essential material of a given discipline may then be studied and understood in relation to its proper historical and philosophical content. I wish to support this point of view and relate some of my own experiences in the teaching of physics at the undergraduate level which give evidence of the validity of this approach to the problem of integration.

With the end of World War II and the return to a normal collegiate atmosphere, the faculty of Occidental College began a careful study of the existing curriculum with respect to the required work in the humanities, the social sciences, and the natural sciences. It was evident to many that there was a need for change in the direction of integration, and general agreement as to basic content essential as a foundation for work leading to the degree in the liberal arts and sciences. The task was not easy, and much time and effort were expended in arriving at a solution. In the humanities and the social sciences there evolved a twenty-four semester-hour course under the title, "The History of Civilization." This course presents and inter-relates the material considered essential in these areas and which previously had been given in a number of separate and unrelated courses in the several departments. The course is required of all students during their freshman and sophomore years. It is cooperatively presented by a combined staff drawn from all of the departments concerned. Although the going was rough for a time, both on the part of students and staff alike, this course has been continuously improved and currently is held in high regard by students and faculty alike. It is not my purpose to examine here in detail this phase of our curriculum in general education, but a study would show considerable emphasis for and support of the thesis presented above relating to integration.

Prior to the re-organization of our curriculum, students fulfilled an eight semester-hour requirement in the natural sciences by completion of one of the foundation courses in biology, chemistry, geology, or physics. These were courses designed to develop departmental majors and to meet the needs of the non-science students. Along with the change introduced through the History of Civilization course came an increase in the requirement in the natural sciences to twelve semester-hours and the introduction of specially designed four semester-hour courses in biology, astronomy, chemistry, geology, and physics. The non-science major now meets his natural science requirement by completing a course in biology, a course in either chemistry or physics, and a course in either astronomy or geology.

The selection of these groupings was largely arbitrary and to some extent represented a compromise to various departmental interests. It was felt that all students should have some understanding of the science of living matter. Chemistry and physics were paired off as an elective choice on the basis that these subjects are inherently more analytical in nature than geology and astronomy, and this would give the students an insight into this particular feature. Many of us believe that in an ideal program the basic concepts of all of the segments of the natural sciences should be included, but we were not willing to attempt this initially at the sacrifice of serious intellectual content. It was unanimously agreed that these newly developed courses should not be of a diluted survey type.

It has been my pleasure to develop and teach the course in physics for the non-science majors, and it is in this connection that I wish to describe my experiences and relate them to the problem of integration. When the proposal was made to the faculty in the natural sciences to develop special courses of four semester-hours credit instead of the established eight semester-hours long in vogue, there were some who said categorically that the time was inadequate to allow for a serious study, say, of chemistry or biology. Their concern stemmed, I believe, from a lack of understanding of just what constituted the framework of basic concepts in their own disciplines. They took the stand that there was no possibility of reducing the complexity or the extent of their material. In my own field, physics, there is plenty of evi-

*This report of an independent experience is a close summary of Dr. Bollman's remarks at the Sixth Workshop of the Foundation for Integrated Education, Oregon State College, June 23rd to 28th, 1952.

dence of this point of view. Examine the textbooks written for the first courses in college physics and you will see what I mean. Those texts most widely used for courses for physics majors are weighty volumes indeed, and contain material in great detail in all phases of modern as well as classical physics. With the rapid expansion in all branches of physics has come the enlarged content of the so-called basic textbooks in physics. The basic framework of concepts is wrapped in a voluminous amount of factual material and description of various applications which is essentially technology and not physics at all. Apparently authors writing for popular acceptance of their work in this area dare not be caught leaving out any detail.

At Occidental College we give a three semester course in general physics for students majoring in the physical sciences, and we use one of the textbooks of the type mentioned. This is a common pattern throughout the country. Our classes are small, and our students are capable; and the pattern has been to take them through the textbook within the time limits of the course. This work is followed by the usual advanced courses in the upper-division, and we have developed some very excellent majors who have gone on to graduate study with distinction. However, I have been concerned about the entire curriculum and have had misgivings about its effectiveness. Recently, stemming out of the distinctly different course developed for the non-science students, I have been awakened to the fact that it accomplishes certain desirable results not obtained in the program for majors.

Although there have been a number of changes during the years in the content of the physics course for non-science students, the major change occurred a little over a year ago when the course was geared to fit the textbook *Introduction to Atomic Physics* just published by Harpers and written by Humphreys and Beringer of Yale University. The authors have deleted much of the detail and even some of the topics ordinarily found in most all textbooks of introductory level to place emphasis on basic concepts and ideas. Students find the book difficult but challenging. The fundamental concepts of classical physics are clearly presented and developed and merged into the framework of modern physics in a logical fashion. The methodology of physics is clearly seen and the philosophical implications are sharply brought to focus. There is a lack of historical perspective, but this is not a serious matter since it can be included in classroom discussion and in supplementary readings. As the course is now given, no attempt is made to try to cover everything in physics. On the contrary the content has been simplified to basic concepts or *constructs*, with the elimination of a tremendous amount of factual material. There is thus a proper balance between the C-field (the field of constructs) and the P-plane (the plane of perception). The course as currently offered is highly regarded and enjoys an excellent reputation within the student body to the extent that students now vie for the opportunity to enroll in the course. This is in marked contrast to the situation which existed under the old science requirement.

The integration which has been achieved through the process of simplification described above has been a catalyst to change in other departmental offerings. In the exchange which occurs between student and student outside the classroom in the informal atmosphere of the dormitory or the student commons, a critical evaluation of the curriculum in general and of courses in particular unfolds. Students are soon aware of what is going on. This has been particularly evident in relation to the physics course for non-science majors. Stimulated by certain outstanding ideas developed in class, the students have sought out the physics majors to continue the discussions on a student-to-student basis. Our majors will compare favorably with those from other schools when judged on the orthodox scale of ability to solve a variety of problems in the various topic fields in physics, but now these students have come to me of their own volition to say that they are having a hard time holding their own in informal campus discussions on basic concepts in physics. Because of a close and informal atmosphere within our relatively small department these students have had the courage to ask why it is that they are not receiving this basic approach to the study of physics which will enable them to distinguish between the important concepts and the bulk of associated fact which is thrust upon them.

This was a serious and justified criticism and it demanded an answer. With the opening of the fall semester all physics majors will take the course originally developed for the non-science students as a foundation for subsequent courses in the department. The three semester course for physics majors will be changed to a two semester course with emphasis on more thorough treatment of fundamental concepts rather than on a comprehensive treatment of the entire field. Consideration of factual detail will be left to work in the upper division in part, but in the main it will be acquired through independent study and reading on the part of the student.

This experience indicates that there is much to be gained in the teaching of physics by using a simplified approach. There is evidence to show that it is not only good for the non-science student but good for the major as well. This integration sharpens up the intellectual content of the discipline at the foundation level, and represents a significant advance in the educational process.

THE NATURE OF MAN

Gardner Murphy

City College of New York

General Trends and Atmosphere Of Modern Psychological Studies

This lecture was delivered by Professor Murphy in the New York University course, "Integrative Concepts in Science, Philosophy, and Education." Major concepts in other lectures of the second term are given on pages 52 through 57.

I am sure you know that anyone who would be so arrogant as to undertake to present a discourse on "the nature of man" would not be worthy of the humble and groping spirit in which all of our efforts are directed today. Nobody knows anything much about the nature of man. We are in a position to raise a great many questions, to raise questions perhaps so grave and so fundamental that we begin to wonder if we even have a method for approaching an ultimate solution. And my task this evening is not to give you pearls of wisdom, but a sense of anxiety and uncertainty. I want to function like these gadflies which Socrates said he represented for the Athenians, a person whose job it is to make you perhaps 1% more eager for knowledge and less certain than you now are as to what we really know about man.

Nevertheless, there are some general trends as to the atmosphere in which the quest may be most useful, and I want to contrast the atmosphere in which we raise our questions with the atmosphere in which the men and women of 100 years ago raised their questions.

One might begin by saying that we have come a very long way from the clean cut attempt to apply the knowledge of simple things to more complex things. We have begun to realize that because we understand in a general way the falling body or even the phenomenon of static electricity, to begin to generalize and to interpret the cell or the living body as a special case of physics and then to interpret the whole living individual as merely an elaboration of the cell — this whole procedure of working from the proposed simple to the complex in the spirit of merely extending the scope of our conquest — has today failed. We realize basically that there are levels of complexity, i.e. emergence, new principles, new ways of thinking which are required as we pass from the simple to the complex. There are more things in heaven and earth than we could ever codify by an infinitely exhaustive study of the local and the particular. The universe is not a duplication of electrons or molecules or cells. It has its structure, it has its architecture, and man has a very definite place in the architecture of the universe. He is no longer to be conceived in the manner of the mechanism of 1850, as merely a special kind of physical agglomeration. That you have already learned from the preceding discussions and you will hear in other discussions.

As Alexis Carrell reminded us in his book, *Man the Unknown*, the only thing we are certain about is that the habits of humility and orderliness in inquiry which apply to simple things also apply to complicated things. Now as the situation looks to us today, what can we learn by applying the method of science, with all its humility, to the kinds of questions that we want to know about man?

I think we may say that one direction in which we find increasing confidence is the conception that we are basically one with the cosmos instead of strangers in it. I think you might say that in the middle of the 19th century, man with all his complexities and his aspirations was essentially alien to the universe which gave rise to his existence. I refer you, for example, to a very extraordinary production, Huxley's *Evolution and Ethics*, in which we are told fervently and yet with acid exactness that our own intellectual aspirations, our own aesthetic and moral demands, are merely special cases. They have no cosmic meaning. Man must create a little corner safe for his own dreams, knowing there is nothing in all the rest of the universe that gives him any support. I'm not even raising the question of theism, the question of a personal deity. Quite aside from such a question, I think no thoughtful modern man or woman believes that you can construct the complexities of human life out of refractory materials. If the universe is basically inhospitable to thought, to aesthetic appreciation, and to human personality, why did these things come into existence and what are their basic meanings? What is their evolutionary significance?

We are told by the theory of evolution that that survives which is fit, fit in the cosmos, that which has a place. It is inconceivable to the modern thinker that human civilization with all its ter-

rific complications, at a level of emergence far beyond anything else that we know, is merely an accidental product of simple electronic or physical events. Recognizing as we certainly do the animal nature of human mentality, recognizing the evolutionary core, and glorying, if you like, in the fact that we have come out of the primal ooze, we interpret this today not to mean the debasing of the human mind, but in a certain sense the glorification of the primal ooze. That is to say, we begin to realize that it was the very nature of that primal ooze to produce man. We begin to realize quite aside from any question of special creation or theism that this is the kind of a universe in its basic laws that had to produce the kind of thing that you and I are. That kind of conception has come to us by realizing the steady and orderly way in which we progress, by a principle of necessity, from simple to complex. And the final result is that we see a meaning at the very core of all those things which are complex and all those things that are worthwhile in us and those things toward which our descendants perhaps may move.

Another illustration equally grand and in the spirit of Huxley is, of course, Bertrand Russell's essay on "The Free Man's Worship," which so many of you have read with those mixed feelings we have when a man leads us to the top of a mountain and points out magnificent countries and says we can't go. Bertrand Russell, of course, tells us, almost exactly as Huxley did, that there is no cosmic support for any of our aspirations; these are dependent entirely on local and accidental conditions which lie in the biology and social evolution of the time. I would be inclined to say that the modern spirit, so far as I can interpret it in the writings of physicists, biologists, and anthropologists, is that just because we have an animal mind which is derived from the stuff of which the cosmos basically is made, we have, at a higher level of complexity, a better chance of understanding the cosmos in the light of our own make-up. Instead of trying to define, then, the complexity of human nature by analogy with, say, static electricity, we hope that maybe we will understand electricity, maybe we will understand the bending of light around a mass at the time of an eclipse, by virtue of seeing something in human nature which throws its light in turn upon the lowliest structures from which it is ultimately derived. Now if one once commits oneself to this view, that there is a certain orderly unity in the whole universe and that there must be in the universe much which functionally and structurally must perforce lead to us and which basically must not be alien to us — a universe in which we can really be at home — then one has to turn the spotlight upon that individuality which we always study when a particular woman or man comes to our attention. This means that we must study the nature of personality.

Now, just as one might say that nobody knows anything much about the nature of man in general, so also one does not know very much about the nature of personality. But there several principles which have become useful in contemporary research in child psychology, anthropology, psychoanalysis, experimental psychology and the clinical study of disturbed people or people seeking guidance. In all these areas one begins to see that there are certain ways of studying which are more useful than other ways. I would like to emphasize these principles.

First, I would like to stress the notion of interaction between the protoplasm of which we are made and the inorganic universe around us. Our language gives us a certain presupposition that there are two kinds of events in the world: personal events and impersonal events. Plato, of course, is celebrated for having made this sharp distinction, ordinarily called dualism. A human personality is one thing. The physical universe is something entirely different. It would follow from such a view that heredity is one thing and the environment is something entirely different. In the textbooks of twenty or thirty years ago you will find lists of hereditary traits and lists of acquired or environmentally-induced traits, and this is perfectly wonderful if any such traits exist. If you look in any *contemporary* textbook on genetics, you will find hereditary traits defined as those regarding which the genetic material is capable of defining, *in a specific environment,* the characteristics of the adult organism. I have particularly in mind Sinnott and Dunn's *Genetics.* They are very explicit on this, but you will find it in almost any contemporary genetics book.

What do I mean concretely by saying there are no traits which are hereditary in the classical sense? To choose an illustration which will probably stick in your mind, there is a type of Arctic rabbit which is, of course, pure white. This is "protective coloration," we say, because of the snow. It is true, there is no doubt about the white coat being a hereditary trait. But rear the animals in the laboratory and vary the light; and they will vary in color all the way from white to a dark gray, depending on the light in which the animal was reared. This is what Sinnott and Dunn mean by saying that the germinal potential is released by an environment and there is nothing which is not released by an environment.

To move from a purely biological to a psychological characteristic, we have long been told about the constancy of the IQ. We have been told that one inherits a certain intelligence quotient. This kind of thing is all right when you are first trying to get your stance, as in studying children in the schools where the situation from year to year is not too grossly different. We now have dozens and dozens of pieces of research dealing with a considerable disparity between environments of one period and environments of another period,

and we find quite literally that the functional intelligence depends upon the interaction of the germinal potential and the environmental opportunity. Cases, as in studies by Newman and his collaborators at the University of Chicago, often involve twenty or thirty or even occasionally forty points of IQ difference where there are different environmental pressures operating on the same germinal material, as with identical twins, for example, reared in different environments, or even in the case of the same individual passing to a much better or much worse environment. In other words, heredity remains as important as it ever was, but it is seen in terms of the interaction principle.

Personality is, in its very core, an interacting kind of reality. We used to like to draw a circle around the person. What's inside is his personality. What's outside is the environment. Today we think of a flow, just as the air you breathe comes in, plays a part in oxidizing the blood, then is breathed out as CO_2. When or where does this breath become a part of you? Some of the oxygen is carried around by the red blood cells, but the air is flowing in and flowing out. All of us in our socially-derived personality traits are in a process of flowing or changing all the time as we intercommunicate with other people. Personality is a state of flux, constantly defined not by one person but by a relation between two or ten or a million people.

Another concept we are pretty sure of is that, if we apply this principle of emergence mentioned a minute ago (by which we go from the simple to the ever more complex), we find that every trait of personality can be placed in terms of a particular hierarchical structure. You may, if you like, think of a pyramid with a base and moving slowly to an apex. There are a lot of our traits which as yet have not become integrated into the total structure. You can see that in early infancy. Gradually the person becomes consolidated or organized and becomes a complete and unitary individual which he certainly is not as an infant. Following the work of Heinz Werner it is possible to speak of three levels: (1) a level of diffuse, global, relatively uncoordinated activity, in which both the perception of the child, as represented in William James' classical phrase "the booming, buzzing confusion" of infantile experience, and also the motor performances of the child are vague and confused; (2) A second level in which specific perceptual objects — watch, hand, head — are defined, and specific actions of hand or foot are evident, and habits are formed; (3) Finally, a third level in which there is genuine *integration,* and the various components of the individual — the things he sees, loves, and wants to be — are held together in a tightly-knit personality structure or integration.

This actually gives you the principle of emergence right within the individual person, as you see him, finding himself, or building a unity out of the diverse materials present at the beginning. This building process is a joint process in which an individual — what's inside the skin — cooperates with what's outside the skin, the environment.

From this follows my next principle, which is that in any structural whole each of the various parts is no longer independent but betrays its place in the total pattern. This is what Gestalt psychologists call "membership character in the whole." They point out that if you see a blotch of orange in the sunset (which is an organic aspect of that sunset), you can't carry it home and place it against a gray square in your home and, looking at it, see the same orange you saw in the sunset, because it depended for many of its attributes upon its context.

We begin to realize that this principle applies with a vengeance to every aspect of human individuality. I drew an illustration a minute ago from intelligence. We used to think you could measure human individuality by means of a series of separate tests which then would be entered on a profile, each item separate: so many points of IQ, so much intro- or extroversion, so much sense of inferiority, etc. We begin to realize that every aspect of the individual reflects the whole system. For example, we know today by clinical and, recently, by experimental studies that the intelligence of the individual reflects the emotional jam or state of excitement the person is in. We used to say, "Well, this is just the *expression* of intelligence that's affected, but the basic intelligence remains the same." But, more and more, under the influence of what we call operational definitions, we begin to say that it's the intelligence you can actually draw out of a person that is functionally the important thing; and if a person is saddled with a fundamental unconscious conflict of the sort that a psychoanalyst tells us about, his intelligence in that particular context is not the intelligence which you might theoretically predict, knowing heredity, etc.

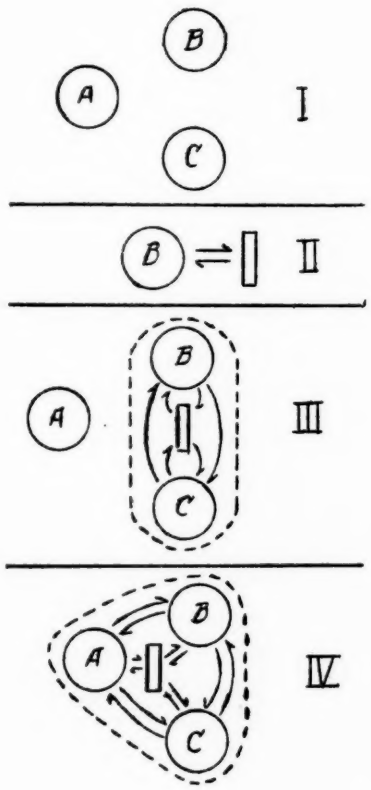
The actual functional intelligence is an expression of the whole person. His love of music or hatred of political radicalism or anything in it is an expression of the complex system. So we have a very complete case of an emergence involving a higher level and of the membership character in the whole, about which the Gestalt people talk when they're describing perception. This applies not only to perception, but so far as we know, to everything in personality.

Now these three principles about nature, nurture, the levels and the principle of structure, lead us, I think, to a more general and comprehensive principle which I will call "field." The principle of field relationships can be oversimplified or summarized in a phrase, that every event is determined by an organized structure within which it is simply a specific aspect. This will mean that human personality in all its aspects can be under-

stood only when the entire context within which the personality is functioning is defined. Suppose I tell you that a man has an IQ of 117, and I don't tell you who tested him, or where, or by what method; or suppose I say he's certainly an extrovert, and I don't tell you in what kind of world he moves, what his job is, who his friends are, what his family is like. You have no conception whether I am talking about something that appears in one situation as well as another.

You know, on second thought, that we don't carry such traits around like birthmarks on our skin, unaffected by the environment. I want to use a somewhat extreme illustration, one that my wife observed, but the interpretation is mine—an extreme one merely because I hope you will remember it. This was a case of three little children in a nursery school, two of whom were normally adjusted children and one of whom literally never laughed and hardly ever smiled. He had been observed for hundreds of hours by careful and systematic observers; and he simply never laughed. You might almost suspect organic brain disease. In most respects he was a fairly adequate little guy, but with a serious difficulty as you see.

I. We'll represent him over here by A. There are also children B and C who are normal, laughing, and crying children. (See diagram.)



II. Child B brings to the school a jumping-jack (the jumping-jack represented by a rectangle).

III. He plays with it and thinks it's lots of fun. He begins to laugh. He brings it over here to child C, and now a field is established in which the jumping-jack, B and C are involved.

IV. B and C are both beginning to laugh. A begins to sidle over to the situation — hesitant, uncertain, feeling his way — and the next thing you know there is a full-fledged giggling party like a bunch of twelve-year-old girls away at school.

They can't stop giggling, they are so full of fun. It's a wonderful thing. The little boy who almost never smiled and never laughed is caught in a situation which hadn't occurred before. What is the meaning of the fact that the boy didn't laugh? Perhaps partly a function of situations, at least we hesitate to say anything about personality unless we know more about the life context than we ordinarily do.

Think of your fairly good friends who are not your most intimate friends. You wouldn't hesitate, I am sure, to characterize them in terms of their ambition, sense of humor, etc. But do you know the life context in which they function? Do you know what their personalities would be, what the field relations would be if they were in different environments? We are beginning to realize more and more that everything we can actually study in human individuality is an expression of a complex, inter-personal field. We don't like that, because from the time of Plato on, the sacredness, and, if I may say so, the isolation of the individual person has been regarded as a fundamental moral or moralistic principle.

Self-sufficiency, or ruggedness of individuality, is supposed to mean capacity for isolation from the social context. I think I may say that, hard as it is, we are going to have to give up this way of thinking.

Now we come to a rather serious question so far as method of research is concerned, and serious for the whole philosophy of science. Suppose that instead of a little boy who laughs we should happen to be concerned here with a scientist who is looking down a microscope or who is making observations about a heavenly body, and maybe the situation includes some other astronomers, a telescope, or what-not. The observations are a function of the instrument, the other people, and the man's own personality, not added up in separate chunks but organically related. In other words, every scientific observation is an expression of a field. Every scientific observation is an expression of relation between an observer and a complicated external context. The man never observes the event. The man never observes himself. The man, by the nature of the case, can only observe himself in relation to the event and the event in relation to himself.

This has the most devastating consequences for our whole conception of what science is. To be sure there is scientific objectivity in the sense that different individuals all use this telescope and they can check observations and they can to some extent make allowance mathematically for differences, but insofar as they all have the same biases they cannot tell how the bias comes in. Insofar as all human beings have certain biases (they all as they function as scientists have sense organs, brains, endocrine glands), there are certain human biases that go into cosmic interpretation. We find in the cosmos the things that are in us. Eddington uses the example of the sculptor who says, as he looks at the cube of marble, "I'll prove to you that there's a beautiful girl inside this chunk of marble." He lays a bet, and the confident opponent takes the wager. He goes to work and he chips and cuts down the marble, and soon he's created the statue and he says, "See? I told you it was inside here all the time." The method of the scientist, then, is to rig the situation until he gets what his own mental requirements presuppose.

But there is a step beyond Eddington. Instead of being discouraged by this, I think the modern view is to say, "Fine, we started with the assumption that we are one with the cosmos and we can find things in the cosmos that are one with us, and give up the futile quest (from Kant we know that it's futile) to get a kind of knowledge which is dehumanized." We might as well say that we've come to the point now where we have a full empirical psychological and biological justification for Kant's skepticism.

But we can turn the skepticism to a very constructive direction by saying that two can play at this game. If it turns out that the cosmos is defined partly by the nature of what we are, so also we find out a lot more about ourselves by bringing ourselves into this two-way relation with the cosmos. We don't pretend when we get through that we have any super-human knowledge; but we *do* claim human knowledge which is more complete than we ever could have had if we pretended to some ideal independence or objectivity. The relativity people are always saying there is no "specially privileged position." There's no place in the universe from which you get a better squint at the universe than any other. I would spell that out a little further. I would say all positions involve some human special slant, and it's the study of special slants that science takes up. It's the study of relations of observers to things observed; and it is the very nature of man to be caught up in the material in exactly this way, and to give humanists the material, and to give scientific external objectivity to the human material jointly.

There's individuality at work in all the processes we have described, even in the constitution of fields in the sense that the three boys in this situation and the three scientists also, although all taking part in a socially defined field, still put their own stamp in some way upon the data.

I think from such a point of view one has to ask: Does the orthodox approach of today's science map out safely the next few steps? I think the answer (associated with Kirtley Mather, Robert Lynd, and a few other people) is that we always learn more from the "outrageous hypotheses." I'm going to take part of your precious time to take certain outrageous hypotheses, things that don't fit with current psychology or biology and which, because they don't fit, are likely to jolt us into recognition of still broader horizons.

I'm going to talk a few minutes about psychical research, which is an area of investigation which has become rather highly specialized in publications which are not widely read except by the research investigators in the particular field. But I'm going to try to choose some experiments which are pretty simple and repeatable and which, I believe, do define to some degree an important area of extension of our knowledge of personality.

We have, for example, at the University of Gronigen in the Netherlands, a psychology laboratory of two rooms, one directly above the other. We cut out a square hole about 18" across and put in sheets of plate glass in the floor of the upper room. We have a black cage in the lower room in which a blindfolded man sits. The light is on in the lower room. It is totally dark in the upper room. There are bags of paper in the upper room which contain letters from A to H inclusive and numbers from 1 to 6 inclusive so we have sections marked off like A4 or B2. This checkerboard is placed out in front of our experimental subject who is to try to receive telepathic impressions from the psychologists who are in the upper darkened room, drawing numbers from the bag at random. They *will* that the man should make a tap on a particular square. He is blindfolded, you remember. He sticks his hand through a slit just big enough for his forearm and when he feels that the mental pressure is strong enough, he taps on that square. 187 experiments are conducted. There are 48 different squares, so he has 1 chance in 48, which is a little better than four successes to be expected in the course of 187. He got actually sixty successes in this experiment. This kind of thing led into studies of physiological variation, galvanic phenomena of the body, effects of drugs in increasing and lowering the results, etc.

This type of investigation of telepathy and related processes has been taken up in this country in a number of places — Harvard, Stanford, very notably Duke University, the University of Colorado, City College, Bard College, Hunter College — a good many places and a pretty large and consistent body of experimental material has been developed.

It is true that some people would rather have us put our primary attention on the so-called spontaneous cases. The spontaneous case is like that

recently reported by Mr. Hayworth of Dallas. He came home at night after teaching an amateur astronomy class, felt rather wide awake, didn't want to go to sleep at midnight, finally lay over to go to sleep, and suddenly was aware his father was in the room. He was quite astonished at this. His father, he thought, was in California. He jumped up to greet his father and shake his hand, but his father disappeared. It all seemed very strange. Then there were footsteps on the path outside, the doorbell rang, and he was handed a telegram announcing his father's death in California. One of the curious things when his father appeared was that he wore work clothes with a caliper ruler in his pocket instead of being in business clothes. In time a letter came from his mother telling that his father had been working on the car that afternoon. He had his old work clothes, there, with a caliper rule in his pocket, hanging over the chair at the time he died.

These incidents are common enough. There are hundreds of them carefully recorded. Often there is close coincidence as to time, etc., so one says to oneself, "This is a *prima facie* case." To which the research man says, "There is all the difference in the world between a hypothesis and a completely definitive scientific case, which ordinarily depends upon experimentation." That's the reason why I contrast the two types and emphasize the experimental.

From the Duke University laboratory under Dr. Rhine one has several studies of the effects of distance. One investigation involves a distance of 150 yards between two buildings at the university and the other involves a distance of about three times as much. A prepared set of cards face down was looked at by an experimenter who, every thirty seconds, lifted a card off and went on to the next card. Our subject at a distance of 150 yards or more recorded his impressions till 1,850 of these individual guesses were done, with fantastically high successes maintained day after day at a level which would be achieved on a chance basis only if every man, woman, and child in the world did nothing else.

This is characteristic of what are called specially gifted subjects. There are also many investigations not done with specially gifted subjects, but done with the ordinary run of people. It was Gertrude Schmeidler at Harvard in 1942 who began to suspect that the reason for many unsuccessful experiments in this field lay in the fact that we grouped together people whose attitudes were different. She decided to use two rooms in Emerson Hall, the Harvard Psychological Laboratory, in one of which material (a set of cards) was prepared to be guessed, and in the other of which sat the subjects. Each subject was asked whether he believed that, working under these conditions with the material invisible in the other room and the doors closed, it was possible to make successful calls at a rate greater than could be expected by the laws of chance. The people who answered, "Yes, it is possible," were called "sheep" and those who answered that it was not theoretically possible were called "goats." Now, in the experimental results in the first cycle of data that Dr. Schmeidler collected, the "sheep" began to go above the chance line, which is five out of twenty-five in the material of the sort used, and the "goats" began to go below the chance line. I said I wasn't satisfied with that — it only represented a few thousand individual calls — and she must do it over. She did it over a second and a third time, and the following year she went into the Harvard Psychological Clinic and she did three more cycles until finally she had accumulated 175,000 calls. A very, very clear statistically dramatic difference between the sheep and the goats is finally achieved in terms of what might be called the intra-psychic readiness to perform. Some people can't function this way. This non-performing is similar to what is being called today negative pre-perception. In the journals you'll find cases in which the inability to function is related to basic inner resistance.

Dr. Schmeidler has also used the Rorschach test of personality diagnosis, and has found that among the sheep the general level of adjustment is very fundamental to success, well-adjusted sheep scoring above the chance line, and poorly-adjusted sheep failing. In other words, we are beginning to see personality dimensions which are fundamental in relation to the liberation of these so-called ESP powers.

More recently we have also from Harvard a study by David Kahn, who at the time was a senior in the college. He had been given a challenge to do this sort of thing using the rigid methods of modern IBM machinery. IBM machines will score your guesses regarding test cards to see if you can make the right answer to certain test questions. A member of the psychology department prepared random targets, i.e., cards marked in such a way that it would be only by a fluke if one's guesses could in any sense correspond to them (the series of marks on these cards are not orderly but are completely random). The test was to determine if a subject, after the material has been locked up, can (to a degree significantly greater than chance expectation), make marks on his paper match the ones on the targets. This was done with statistically significant results. This study is about to be published, and is, I think, the best attempt to meet the routine objection that you can't do this sort of thing under specially prepared foolproof conditions. This was done specifically to meet this specific challenge. Kahn also went ahead and worked on these personality dimensions which we noted—e.g. Rorschach test, etc.—and much of the material recently coming in is confirming the sort of thing which Dr. Schmeidler and others had done.

Now do these types of perception which are called "extra-sensory" present the same fundamental operations of psychology which we know from other experience, or are they basically different from the operations we know in everyday life or in the psychological laboratory? In some respects they represent the same dimensions. For example, we know that the role of motivation in ordinary perception is quite great. To some degree one sees what one wants to see, and rejects seeing what he doesn't want to see.

(a) We find that the whole psychology of needs, motives, or drives as we have it in normal sensory perception likewise applies directly to extra-sensory processes.

(b) We have a principle known as satiation which is rather close to the principle of boredom, getting fed up so you can't function anymore. It operates the same way in the ESP field as in the sensory field.

(c) We know perception is largely dependent upon structure. We know you don't randomize the material as you see it. You give it some sort of life or organization. Rhine has shown, I think quite clearly, that when you interrupt a series of twenty-five calls after every five calls, the successes tend to be on the first and fifth, sixth and tenth, etc. In other words, the structure of the task enables you to pick out that which stands at the ends exactly as in the case of sensory perception. You know if I gave you some lists to learn, you'd remember the first and last items of short lists. They would stand out. The same is true of extra-sensory phenomena, regardless of the distance of the individual from where the material is placed.

(d) There is the principle of interference. Give two tasks at once. They interfere in the same way in ESP as in sensory perception.

The "field principle" I mentioned that holds in sensory perception holds clearly in ESP. Thus, we have today experiments in which you have two or three people working at once, sometimes to reinforce each other in the mental telepathy experiments, sometimes to interfere with each other. We have very clear evidence from the experiments of S. G. Soal, University of London, that certain persons can receive successfully from certain senders. Again, using two different rooms with elaborate precautions you find that certain people are successful senders for certain subjects. They represent a hookup, an inter-personal relationship which is favorable, whereas other people consistently don't. With long strings of data lasting over weeks, you find consistent success with certain pairs and consistent failures with others. We seem to begin to find in all this curious grab bag a lot of principles that look as if we were dealing with special cases of sensory perception except that we have these long distance results and results the physical mechanism of which we are not able to divine.

This leads me to repeat what I said a minute ago: in some respects these extra-sensory phenomena illustrate the same general principles we were talking about for normal perception and normal personality functions. But there are three respects in which the data do *not* represent an equivalence in the two systems. There is, first, the fact I have mentioned, a fact now very well confirmed, that the distance factor is not important. One of the best experiments is one done by S. G. Soal with an observer in London, and a subject across the Channel in Antwerp. There are several other series. One from South Africa is very clear-cut in its results over a distance of five hundred miles, and there is much material of that sort in our own country.

This is not like the operation of radiant energy. The physicists with whom we have consulted on this matter — this is a fair question to ask the physicist — with one accord say, "Don't demand explanations from us at this time. How could vegetable dyes printed on a card have an effect over five hundred miles? This is nonsense. If you wish to say this belongs to the physics of the future, that's fine, because nobody can say what the physics of the future will be. The physics of today has nothing to offer."

We have something here, then, which may very well blast through our hesitation, and give us what might be called a trans-spatial conception of a personality function, and we don't know anything about trans-spatial functions in sensory perception. We know only limits depending upon the energy of stimulation. We seem to have something here which opens up a new dimension in personality investigation.

There is also some material, too detailed to do much within our limited time, dealing also with a curious tendency of some people to hit not the target which is exposed at the moment but the target which will be exposed two or three seconds later. We have been working on this matter for years, under various types of randomization such as that at the time the call is made there simply is no specificable future event. A random event determining the card-order occurs between the call and the realization, and yet the individual working against the random event can, to a degree significantly greater than chance, hit the thing on the nose. This has classically been called *precognition*. Of course, it makes lots of philosophical difficulties. We seem to be having here not only *trans-spatial* but *trans-temporal* operations. A good many have been wondering about the whole "uncertainty principle" in science and about the question as to how accurately you can specify the moment at which an event occurs, whether there may not be something like William James' "specious present," a sort of span of time all of which is simultaneously, contemporaneously available to the individual. Nobody is philosophically adequate to this problem.

I mentioned a minute ago the field relations in telepathy, the inter-dependence of persons. This is a way of saying that these processes are not only trans-spatial and trans-temporal; they are also trans-personal. They are not the ability liberated inside of some one individual. We no longer make it our chief task to look for the gifted subject. We realize that it is the gifted subject in relation to the gifted agent, transmitter, or some other persons in the situation. We begin to realize, in the classical phrase, "no man is an island." We begin to realize that individuality is not so individualized as we like to think it is, as I said in another connection. We have a situation like a lot of islands that seem to stick up out of the ocean merely because we don't take into account the fact of the film of water there which may rise and fall, and many of the islands of today become a part of the continuous land of one thousand years later. We don't know ultimately what the inter-personal relations between supposedly isolated human beings may be. We might ask, "Is personality open, is personality something which reaches out without definite boundaries in terms of the field theory I sketched earlier in talking of sensory phenomena?" I would say: probably yes. But the only thing we can do is say we need much more research to warrant a judgment.

Of course, the great philosophical question that bothers one always is whether these phenomena are in a sense continuous, organically one with the ordinary events which are easier for us to grasp, ordinary events involving physical interchanges between our sense organs and stimulating objects. Are we dealing with an extension of the known? Or are we dealing with something discontinuous with the known? That might be related to the quantum question, you know. You have many of these irrational discontinuities in nature. If you get a quantum, you get the whole quantum, not two-thirds of it. You get it and then maybe you get another one. You don't have a continuous system. You have a system of jumps or discontinuities. We may have something like a quantum involved here. One of the most fascinating questions is to see whether we can develop our knowledge of sensory perception to a point where it will come in contact with the extra-sensory phenomena.

I am inclined to suspect from what's been done in the last fifteen years that we are more likely to find the line of extension of knowledge in the other direction. We are more likely to find out from ESP things which will begin to have a retroflex effect upon our every day operations and begin to give us a deeper understanding of the here and now. It isn't the first time in the history of science that, when we were trying humbly to work from here out to the unknown, suddenly the unknown has come up and insisted on being listened to and has suddenly altered our conception of the here and now. It is entirely possible that we shall find, as William James said, that "our present type of consciousness is only one of many types of consciousness that exist." We may, by defining the far and unknown (if we can do it with honest systematic research techniques) find a way of getting light on the immediate things in front of our noses which may take on new meaning.

Think of all the work represented by the biologists before the time of Darwin. Think of the wonderful Asa Gray botany. He classified so beautifully in terms of resemblances without a knowledge of the evolutionary principle. But when the evolutionary principle, which was so far beyond what men felt they could legitimately entertain in the beginning of the 19th century, was once grasped, then suddenly Gray's botany and all the simple things of here and now took on a new and transcendant kind of meaning.

I warned you I was going to try to undertake something rather hard to accept, rather far from the safe and sane. I do so only because I think there are two jobs, both fundamental, for anybody who tries to talk at all about the nature of man. The first is to define what we know, and I have tried to do that very tentatively and uncertainly —talking about growth and nature-nurture interactions, levels of emergence, the principle of structure, field organization, the role of the observer, and above all, the fact that we flow into one another dynamically through social interaction. That, I think, is one pillar of our present limited knowledge. I think the other pillar which was despised till recently is psychical research. It has been growing to considerable stature, has handled with confidence a series of problems which at first seemed utterly baffling, but which have turned out to yield many of the same principles we were discovering in our study of ordinary investigations of human personality — principles that are known also through other sciences. Certain aspects of this new kind of investigation also begin to make us wonder as to the adequacy of the physical conceptions we've been using — the adequacy of the conception of the physical nature of man and the limitation of human nature to physical interaction, the conception that we are only at a single point in time and cannot in any sense be said to exist in the past and the future, the conception that we are rigidly defined individualities, each sealed up solipsistically inside of ourselves. Contrast with this the conception I have tried to share with you that, perhaps, personality is in a very basic and paradoxical sense an inter-personal thing, and that the realities are inter-personal realities. From such a point of view, one would finally come to the point of restating in broader context what we suggested tentatively earlier. It may be that the nature of man will ultimately be clarified as much by putting brackets around many of the certainties of supposed dogmatic sciences today as by reaffirming what seems most obvious. It may turn out that

the habit of questioning, of looking beneath what seems obvious, will finally bring us a very unexpected resolution, so that what *seems* to be in shocking contrast to what we know will turn out to be really an extension and confirmation of what we know.

My own personal belief is that the principles on which I spent the first half of the time this evening are being confirmed and extended by the development of parapsychology and that parapsychology, instead of being an unwelcome intruder, will turn out ultimately to be an enlarger, systematizer, and aid in the types of groping which I think are today effective. Time only will tell, but I certainly would feel I were delinquent in my task if I gave you the impression that all the truth lies either in the codified packages of today or in the wild speculations of tomorrow. It is characteristic of science to keep your feet on the ground. My friend Heinz Werner is responsible for this quotation with which I will end: "The scientist has to be like a turtle, with all four feet squarely on the ground, but always ready to stick his neck out."

INTEGRATIVE CONCEPTS IN SCIENCE, PHILOSOPHY, EDUCATION

Some of the Major Integrative Concepts Presented In the Course, "The Frontier of Knowledge"

We publish below compressed accounts of certain major aspects of the first seven lectures in the Spring, 1952, term of the New York University course, "The Frontier of Knowledge: Integrative Concepts in Science, Philosophy, and Education." The form of expression here given to the arguments is (because of excessive reduction) not necessarily that of the speakers. Accounts of the first term lectures were published in Vol. 8, No. 4.

Verbatim lecture reports have been prepared approximately up to date, and will, under certain conditions, be made available as part of the cooperative program on the frontier of knowledge which the Foundation for Integrated Education is ready to offer.

Second Term

Lecture I. Formal and Operational Procedures in Science, Dr. Henry Margenau, Higgins Professor of Physics and Natural Philosophy, Yale University.

(This lecture was printed in its entirety in Vol. 9 No. 1 of MAIN CURRENTS.)

Lecture II. What is Scientific Truth? Ernest Nagel, Professor of Philosophy, Columbia University.

According to Aristotle, the first principles of every science must be such that: (1) they state the cause on which the facts which are to be explained depend; (2) they show that the facts could not be other than they are; (3) they must be true; (4) they must be in demonstrable; and (5) they must be better known than are the conclusions which follow them.

The tradition I have outlined has been radically transformed, and now appears outmoded to most contemporary scientists, although perhaps not to most contemporary philosophers. I want to indicate some of the steps in the history of thought which have led to the undermining of this rationalist tradition.

The first well-known event was the Copernican revolution, which substituted a different theory to account for planetary motions from the one that was widely accepted. The Copernican revolution indicated that it is possible to have more than one theoretical explanation for what appears to be the same set of facts. The development of an alternative theory made clear at least in principle that there appears to be no logical root which leads from matters of observation to these comprehensive theories in terms of which we attempt to make some kind of order out of matters of observation.

The second important event was the establishment of modern dynamics by Galileo, Kepler, and Newton. The introduction of a scientific idea such as that of force in the Newtonian sense is not something that arises immediately out of matters of observation, but requires a certain degree of constructive imagination. This does not follow immediately out of the data of the experiment but is something the scientist himself has to supply as a way of interpreting the field he is studying. The introduction of such ideas tended to indicate that something must be fundamentally wrong with the rationalist view as to what are the proper objects of knowledge and how they can be attained.

The third event was Hume's critique of the principle of causality. Hume pointed out that the supposed necessity which resides in the conclusions of science is not there.

The fourth item was the discovery in the 19th century of so-called non-Euclidean geometry, with the consequent distinction between what is now called pure from applied mathematics. A number

of mathematicians found there were alternatives to Euclidean assumptions. In consequence, these assumptions could not be regarded as self-evident truths but at best as hypotheses in terms of which a great variety of material could be analyzed. One of the main strongholds of the traditional conception as to the nature of science was shaken to its foundations. The question was raised, under what conditions are we to regard statements in any domain as being meaningful or as true?

I am going to restrict my use of the word true to the conception that a belief or statement is true if there is agreement between the statement, idea, or belief, and something which falls outside of it.

Conditions for the acceptance of truth are entirely formal and must be stated in terms of a generalized account of the logical methods of modern science.

However, there seems to be no logical path from data of observation to the theoretical interpretations which constitute explanations for what we find. Science employs the hypothetical deductive method: One is faced with a problem. He constructs a hypothesis. He sees what follows logically from the hypothesis. He must then subject some of the consequences deduced to experimental confrontation.

Facts cannot be ascertained without reflection, and sensory experience alone does not reveal what is a fact. Observation, not uncontrolled, but guided by certain principles of analysis is needed. What is required is a selection of certain facts which bear upon the problems which initiated the inquiry. Very rare gifts are required to detect and formulate problems which turn out to be fruitful and fertile.

Hypotheses must be capable of a logical mode of elaboration. Purely formal considerations are never sufficient for establishing their adequacy. The method sciences cultivate is one of systematic doubt, confronting one hypothesis with another to see which one will fit the facts more adequately. Every conclusion of science attained in this manner is capable of being reconsidered in light of fresh evidence.

However, it seems to me there is one thing which is more stable than any particular conclusion asserted by science: the method it employs in subjecting its tentative conclusions to testing.

Finally, what is scientific truth? First, it is not a different kind of truth from that obtained in the ordinary course of living. The conclusions of science attempt to give us a set of principles in terms of which crude material of ordinary observation can be exhibited as falling into some kind of pattern. According to the conception which I have tried to outline, there are many truths. However, according to me, there are not many methods, but one method of achieving truth, that of science.

The ideal of a systematic integration of the various specialized disciplines under the aegis of a common set of principles is being progressively realized in certain areas of specialized inquiry. In consequence of this integration, what the sciences achieve for us when they are not concerned with specialized subject matter is an integrated perspective. The sciences do not convert the familiar world into an illusion. They do not disclose another superior world of reality to which we may escape from the present one. The sciences enable us to make an effective use of our powers and at the same time indicate the conditions and limits of successful action.

Lecture III. The Nature of Man, Dr. Gardner Murphy, Professor of Psychology, College of the City of New York.

(The complete transcript of this lecture appears on pages 44-52 of this issue of MAIN CURRENTS.)

Lecture IV. Theories of Learning, Dr. Mark A. May, Director, Institute for Human Relations, Yale University.

All education, science, art, religion, and culture depend upon the basic capacity of man to learn. Learning is an integrative principle, socially and scientifically, because by the capacity to learn, habits, motives, beliefs, and values are derived and communicated to bind men together or to keep them apart. Learning is basic to the development of a science of behavior. Hence, theories of learning are central and important.

Not all changes in behavior should be regarded as instances of learning. Some are attributed to maturation, some to the state of health of the individual, some to fluctuation in the strength of drives. Changes in behavior resulting from learning may, in general, be said to be those that depend on practice, study, and past experience. The phenomena of learning may be said to be of three types: (a) acquisition, a process of building up habits, skills, and stores of information; (b) extinction, a process of inhibiting, breaking, and getting rid of habits; (c) generalization, a process by which an acquired trait is transferred from its original context to other but similar situations. The latter also refers to extinction when the absence or failure of a response in one situation spreads to other similar ones.

In both acquisition and extinction the behavior changes while the observable aspects of the experimental situation remain constant. In generalization the experimental situation changes but the behavior remains relatively the same. On their face value, these facts appear to contradict the principle of uniformity in nature. In order to preserve this principle, scientists are forced to conclude that unobservable changes do occur in the conditions upon which the acts depend. This brings about a postulate: Every instance of be-

havior is uniquely and completely defined by the essential conditions under which it occurs, fails to occur, or otherwise changes.

In a young and growing science like psychology it is not surprising to find differences of opinion among theorists concerning the most useful system of constructs.

Learning theories deal with problems of how behavioral constructs are modified by experience. Lewin's "life space" is presumed to become more structed by progressive individual experience. The "cognitive maps" of Tolman are inner maps of external experience and are filled in in increasing detail as learning occurs. Thorndike believes that learning is a process of strengthening or weakening of "bonds" or "connections." Clark L. Hull uses the construct, "habit strength," which is somewhat similar to Thorndike's "bonds." Miller and Dollard used a similar notion called "response hierarchy" which intervenes between "cue" and "response." Learning is viewed as the modification of the essential conditions of behavior by the experiences of the organism.

Hull designates the unobserved action in the motor neurones and muscles which precede an observable response as "r." Other stimulus-response psychologists believe that some "reinforcement" is necessary for learning. Thorndike stated this as the "law of effect" by which it is supposed that a response, to be learned, must be followed immediately by a reward. The occurrence of reinforcement is believed to be dependent, in some part at least, on changes in a behavioral construct called "drive" which is regarded as one of the essential conditions of behavior.

The principle of reinforcement has the status of an empirical generalization. It has not been deduced from a more primitive postulate as a logically necessary condition of learning. Tolman uses a construct called "sign-Gestalt-expectancy" to explain that behavior is cognitive as well as purposive. Kurt Lewin uses the notion of "psychological life space" as his central construct, believing that the behavior of an organism at any moment depends upon the situation as the organism perceives it.

The development of an exact science of behavior depends upon the development of laws that are invariant and not statistical. When exact laws are formulated (and we do not have them yet), it is predicted that they will be statements of relations between constructs, just as they are in physics. I have emphasized the importance of keeping in mind the distinctions between the conditions of observation and experiment on the one hand, and essential conditions of behavior on the other. The latter are defined by "constructs." They are the fundamental determinants or causes of behavior and are permanently modifiable by learning. This modification occurs under conditions that are imperfectly known at present.

All that we know, think, feel, want, and do is a product of what we have learned. We have this comforting thought: "Men, by their own collective acts, can determine their subsequent behavior toward each other." By virtue of this important principle of learning, the destinies of men are in their own hands.

Lecture V. Signs, Personality, and Society, Dr. Charles Morris, Lecturer in Philosophy, University of Chicago.

It is encouraging that there is today a decided convergence of the various studies of man into what might be called a science of man. The purpose of this lecture is to show that the notion of sign or symbol is one of the key integrative concepts of this movement.

The theory of signs is called by many names: semantics, significs, semiotics. For our purposes we shall simply use "general theory of signs." The notion of sign or symbol is a key term because it follows Ernst Cassirer's *Essay on Man* which offers a definition of man as *animal symbolicum*.

The general nature of signs is that they direct action to certain kinds of objects other than themselves by disposing the organism to act in certain kinds of ways.

In considering the place of signs in the social system, it seems that certain types of signs do develop in human interaction which do not develop in animal interaction. These explain the difference of human from animal societies in that whole sets of pre-language, language, and post-language signs develop in human relationships and persist throughout human lives, setting up "complementary expectations" and developing what the sociologist calls a "role."

A role is a set of sign processes, a set of complementary expectations, and role-behavior is a type of symbol-controlled behavior. Institutions, such as marriage, are organizations of such roles.

Differences in cultures may be seen to arise from the differences in roles because of different sets of expectations arising from different symbols. Here cultural anthropology links in with the theory of signs.

Both George H. Mead's *Mind, Self and Society* and Gardner Murphy's *Personality* stress the importance of symbols in the genesis and in the operation of the human person. Mead shows how the acquisition of language is necessary for the development of the essentially human being. Through language, the individual is able to operate within these roles characterizing his society and to control his behavior in terms of the values of the culture embodied in the symbol system he has acquired.

If Mead is right, man's capacity for consciousness of self depends upon symbolic processes of the type involving language.

Murphy shows the importance of symbolic processes in human behavior in many contexts and, if he and Mead are right, the relation of mind and body becomes transformed. This arises because the interpretant of a sign is an organic state and it at least involves some change in the organism called out by the sign. If this be so, then signs will have causal influence on other phases of the organic system. Symbols thus enter into and affect the motivational system of personality and affect the needs of the person.

In many ways, it seems that human needs are in part called out and sustained by symbols, and these, which are closely related to what are usually called "ideas," actually operate in helping to control and maintain the human action system. Sign processes are thus also the link between the biological system and human action.

Lecture VI. The Supraconscious in Human Personality and Culture, P.A. Sorokin, Director, Harvard Research Center in Altruistic Integration and Creativity.

The prevalent theories of the mental structure of human personality are grossly defective. The first of the big blunders consists of merging into one class (by E. von Hartmann, P. Janet, S. Freud, and others), two radically different energies of man: the biological *unconscious* that lies below the level of the conscious energies and the *supraconscious* ("genius," "creative elan," "the divine inspiration," etc.) that lies above the level of any conscious, rational, logical thought or energy.

The supraconscious is known very little. What is known of it can be summed up as follows:

1. The supraconscious seems to be the fountainhead of the greatest achievements and discoveries in all fields of human creative activity: science, religion, philosophy, technology, ethics, law, the fine arts, economics, and politics.

2. The supraconscious creates and discovers through supraconscious *intuition*. It is different from all sensory intuitions, perception-observation, and from logical-mathematical and syllogistic-reasoning. In contrast to senses and reason, intuitional creative inspiration or cognition comes as a momentary flash, different from a patient sensory observation or mathematico-logical analysis and calculation.

The so-called "calculating boys" or "arithmetical prodigies" give an example of an instantaneous operation of the supraconscious, quite different from ordinary conscious mathematical calculation. These persons, often of a low intelligence and incapable consciously of an elementary mathematical reasoning or understanding, have been able to make instantaneously a complex mathematical calculation like a determination of the logarithm of any number of 7 or 8 places, or finding intuitively what factors would divide any large number, not a prime; thus given the number 17,861, they can say instantly that it is 337 x 53.

As to the main *mathematical discoveries*, the role of the supraconscious intuition has been enormous and indispensable. All eminent mathematicians state that their discoveries were "sudden and spontaneous," "without any time for thought, however brief."

What is said of the role of the supraconscious intuition in mathematics, still more certainly can be said of other natural sciences. Eighty-three per cent of 232 natural scientists queried by the American Chemical Society admitted an unpredictable flash of an insight illuminating the essentials of a solution of their problems with a trait of adequacy and finality.

As to the intuitional bases of the valid-logical and sensory propositions of these sciences, these bases have been explicitly recognized by the leading empirical and positive methodologists of these sciences and of their logic, such as August Comte, John S. Mill, and subsequent empirical and inductive logicians.

A detailed study of how inventors happen to conceive their inventions shows unmistakably the indispensable role of intuition; in most of the cases the first idea of the invention comes like a flash, unexpected, often in peculiar conditions, with all the other traits of the intuitional insight.

Still more decisive is the role of supraconscious intuition in the discoveries and creativity in *language, the fine arts, philosophies, humanities, and social sciences.*

Finally the role of the supraconscious is overwhelmingly decisive in *religious and moral creativity.*

Many basic traits of the Good and Beautiful are likewise intuitional. Still more true is this in regard to ethical values and manifestations.

To sum up: The supraconscious "furthers the conscious process of thought by its inspiration in small as in great matters."

A specific aspect of the supraconscious appears in extra-sensory perception, psychokinetics, and related phenomena.

The supraconscious or the creative genius seems to be of different magnitude and of different kinds with different individuals and groups. It is distributed unevenly among different persons and groups; and this distribution greatly varies in time.

Lecture VII. Nature, Philosophy, and Culture, Dr. F. S. C. Northrop, Sterling Professor of Law and Natural Philosophy, Yale University.

In the analysis of man's knowledge of nature, we come upon two different ways of knowing: (1) concepts by intuition: that which is given to us with immediacy; (2) concepts by postulation: that which we can infer by scientific methods from (1). Anything is given by intuition if it is directly

apprehended, such as a color or a shape. In concepts by postulation, one comes to know a factor in one's own self and in the universe that one does not directly observe; i.e., we come to know that apparently empty space is filled with electromagnetic waves travelling at 186,000 m.p.h.

Since nature known in the second way is not directly observed, knowledge of this kind is verified differently from the way in which we verify statements about directly sensed colors or sounds. If I say that there is a whitish patch there, you will verify the correctness of my statement by looking at what I say; but if I say that this space is filled with electromagnetic waves travelling at a speed of 186,000 m.p.h., you obviously cannot verify that statement by looking. The method of verification has this form: some scientific genius, by a leap of the intellectual, formal, mathematical imagination, forms a scientific hypothesis. The deductively formulated theory is a body of propositional formulae, a matrix in which a few basic formulae (called postulates) generate all the other propositional functions by the logical relation of formal implication.

One must have what Professor Margenau calls correspondence relations, which join deduced entities, that cannot be seen, to observable images. Thus, if a theory is true, certain images which can be directly inspected must appear. If they do, the theory is verified. If they do not, the theory is not verified and we must wait until another scientist with a creative act of the imagination comes up with a new theory. This is the essence of our knowledge of nature, and it involves the two ways of knowing.

One of our major problems is the relation between the type of knowledge that we have of nature and the type of knowledge that is involved in religion or law or ethics or values.

What do we mean by the word "good"? I suggest that the word "good" is nothing but a name for the basic concepts to which one is led in conceptualizing all the facts of nature known in both ways. Good conduct is conduct in accord with true scientific knowledge about all the facts of nature and natural man. On this theory one cannot arrive at ethics without passing through natural science, including that part of psychology that studies natural man. Natural man, as distinguished from cultural man, is all those factors and verified theories that are not a function of the belief of man. An example of a fact about natural man is that everyone has a nervous system. A fact about cultural man is any fact about the behavior of natural man that is in part at least because of his beliefs.

Goodness or badness comes in only after a natural man begins to get knowledge. Until then, he cannot be virtuous and he cannot sin. It is nonsense to say that the heavenly bodies are bad because they move in a path that is an ellipse instead of a rectangle. But it is not nonsense to say that if I treat you as if you were nothing but so much matter, then I am bad. Why? Because I am judging you as if you were less than what a true knowledge of you as a natural creature reveals you to be. In other words, bad conduct proceeds from a partial theory of what man is or a theory that is false.

Any scientific theory is a set of basic concepts from which all others can be defined or deduced. Such a set of concepts is a philosophy. Ethics is that philosophy applied, and the difference between a good and a bad man is the difference between a man who makes judgments from a partial or false philosophy and one who acts from a more complete philosophy that has taken into account all the facts so far as humanly possible. We can never be sure any of us have the absolute truth because we are all approximating, study as we will. There are always facts we have not found. There are always facts which our traditional scientific theories do not completely account for. Out of this arises the conflict in moral judgments, the conflicting ideologies, the diverse philosophies that characterize the world in which we live.

I believe that all the religions of the Orient are scientific theories. They seem peculiar to us because they refer to different factors in experience. In the West the positivists like Hume and the present Oxford positivists saw only the sensed qualities and overlooked the continuum of immediacy within which the sensed qualities come and go. This continuum of immediacy is, I believe, what the Oriental philosophers mean by Brahman, Nirvana, and Tao. Therefore good conduct from the Oriental point of view consists in realizing that a person is not merely the transitory, human, empirical sequence of images which is his sense self, but also the all-embracing continuum of immediacy which is timeless, and within which the sense self comes into being at birth and fades out of being after death. From the standpoint of this philosophy, if I act as if you are only the images I have of you that are different from the images I have of myself, I am bad because I have overlooked the fact that there is also in you and me this continuum of immediacy. Also in this theory all knowledge about definite things is transitory knowledge because every concept is a concept by intuition. If it is referring to definite things, it goes back to differentiations in the Brahman continuum of immediacy, and every differentiation is transitory.

Every proposition is apprehended directly. We apprehend the continuum of immediacy in which we come and go. I believe that societies (such as the Oriental societies) which go back to knowledge of this kind do not go through cycles in time.

One of the tragedies of modern scientific philosophy is that it generated contradictions. To solve these contradictions, modern philosophers went from one philosophy of modern physics to another.

The demoralization of our world arises out of the conflict of these different philosophies generated by modern science. Thus in a sense we are honest when we find it difficult to integrate our knowledge, because there is no integrative knowledge except as there is a single philosophy. When there are different philosophies, although each is an integration, the conflict between them generates relativity, demoralization, and chaos. Whenever, using the conceptual way of knowing man and nature, a traditional theory breaks down, society has nothing to do but to refer to the continuum of immediacy. Then a genius like a Newton or an Einstein formulates a new theory. When this breaks down, the society returns to positivism. This is why Professor Sorokin finds that society — and I think it is only society in the West — tends to go through cycles in which we have first a sensate culture, then a postulated theory that neglects the continuum of immediacy, then a kind of synthesis in what he calls an idealistic culture. With time, what the sciences postulate breaks down and the cycle returns to a sensate culture. It is one of the characteristics of our time that our postulates have been breaking down and we are living in a sensate culture.

But we know we are not going to stay in a sensate culture because not only have our old theories in physics broken down with Einstein and Schroedinger, we know the new theories that are to take their places. This means that the physicists have already moved out of sensate culture. I want to suggest that in a philosophy of physics which conceives of our scientific knowledge of a natural man as involving both the continuum of immediacy and the theoretical component, we have a philosophy of contemporary physics that is adequate to all the facts. This philosophy, I believe, gives us the meanings necessary to account for the basic concepts of the non-sensate far Eastern religious cultures of Hinduism, Buddhism, Taoism, and Confucianism. It has in it the non-sensate rationalistic meaning necessary to account for the theistic type of ideational and idealistic cultures of the Semitic, Muslim, and Christian West. In the synthesis of those two, it may even suggest the possibility of a single philosophy which not only integrates ethics and natural science but may also have promise of integrating the diverse ideologies and civilizations of our world, Oriental as well as Occidental.

RELATIONS BETWEEN EAST AND WEST*

Unesco Discussions on Cultural And Philosophic Questions

The Unesco "Discussion on the Cultural and Philosophical Relations Between East and West," which was held in New Delhi, India, from December 13-20, 1951, embodied a significant step in the building of closer relationships between the East and the West.

The report prepared by Professor J. T. Christie of Oxford, the rapporteur, includes a summary of the proceedings, a number of general conclusions, and recommendations regarding the best means of developing closer intellectual and moral ties between the peoples of East and West. This report will be printed in the volumes which Unesco is to publish, in English and French, as a sequel to the work of the meeting.

The Secretariat embarked on the preparations for this discussion at the beginning of 1951. With the help of Swami Siddheswarananda, of the "Mission Vedantique Ramakrishna," and Professor Olivier Lacome, of the University of Lille and the "Ecole Pratique des Hautes Etudes" (France), a basic document (UNESCO/CUA/28) was prepared. The National Commissions of Unesco's member states were asked to transmit any written observations they might wish to make for the purposes of the discussion. The Government of India helped Unesco to organize the discussion.

Twelve eminent specialists, chosen in consultation with the National Commissions from different quarters of the world, were invited by Unesco to take part in the discussion on the theme, "The Concept of Man and the Philosophy of Education in East and West."

The discussions were based on papers prepared beforehand by the specialists taking part, and on the comments transmitted by the National Commissions of Australia, Austria, France, India, Switzerland, and the United Kingdom.

The meetings were divided into two groups: during the first two days, the discussions opened with prepared speeches on the very wide theme of the concept of man in East and West; in the last two days, the main topic was that of the principles on which education was based.

During the first two days, two main themes recurred several times, both in the opening speeches and in the subsequent discussions:

*This article is taken from the Unesco report of the conference held in New Delhi, India, in December, 1951.

(1) The relationship between Eastern and Western thought;
(2) The implications of the new scientific conception of reality, particularly in the West.

The discussions in the next two days dealt with the effects of such general theories on the philosophy of education, and bore mainly on two major questions:

(1) The influence of science on education, particularly in the West;
(2) The influence of democracy on education, particularly in the East.

At the close of the discussions, the rapporteur, Professor Christie, presented a draft report, together with conclusions and recommendations, the substance of which was approved, while the final wording was left for Professor Christie to work out at leisure. On behalf of the Secretariat, Mr. Jean Thomas described the various projects in Unesco's program, offering opportunities for the implementation of some of these conclusions and recommendations.

Lastly, definite suggestions were made regarding the content and presentation of the volume which is to be published, in English and in French, during 1952, with the object of informing the general public of the results of this conference, in conformity with resolution 4.121 in Unesco's program for 1952. In addition to a brief historical introduction, this volume will include the Rapporteur's report, together with the conclusions and recommendations, and the final essays written for this publication by the specialists who took part in the discussion; as the shorthand record of the proceedings is not to be published, the specialists will embody in their essays the substance of the views they expressed in debate; the basic documents prepared by the Secretariat will be contained in an appendix. Some of the speeches delivered at the formal meetings, and, in particular, those given by the Prime Minister, Mr. Nehru, and the Minister of Education, Dr. Maulana Azad, will be included in this publication, in the final version approved by their authors.

GENERAL CONCLUSIONS

Within the first few sessions, it had become a truism to say that the conventional distinction between the active West and the contemplative East was fallacious. There were divergencies which followed an East-West division and they appear in this expression of our views; but it would give a wrong perspective to allow undue prominence to such divergencies, although they will be noted in their place.

The relationship between religion and the spiritual and ethical life

It was generally agreed that in India religion was more truly the basis of ethics and philosophy than it was in the West, where many books on ethics have been written with no reference to religion at all: but though this applies to India, it is not true of other parts of the East, e.g., China. Both Eastern and Western members expressed the fear of religion as a divisive influence: better no religion than one that was fanatical and intolerant.

Man's power to master nature by technology

Here the conference was divided, but not according to an East-West division. Many realized the deadening effect of a machine-age on the soul of man, and the damage done to education if it was reduced to the mere communication of a scientific technique. But it was claimed by representatives from U.S.A. and India alike that science had brought happiness, health, and life itself to thousands, and must not be undervalued. Nevertheless, if it were true that the scientific reason had enabled man to master the world, there were signs that it might enslave man himself, and this was too high a price to pay for any conquest of nature.

This conclusion is closely linked with the issue, *"The limits to be assigned to the power of the intellect: intellectual learning and the cultivation of the whole man."* Here there was warm agreement, even among those who set a high value on scientific research, that the intellectual element was only one part of man's nature and, particularly in the West, was tending to usurp excessive authority. Members agreed in a plea for educating the imagination and the spirit as well as the mind (here aesthetic values would play a vital part): only thus could a student's mind be integrated, and without integration of the individual there could be no integration of a society.

Conceptions of education and the idea of equality: the participation of all in cultural life

From the earliest stages education should emphasize the dignity of the individual whatever his social status: the Gandhian conception of basic education should be developed. Nationalist tendencies in education, especially in the teaching of history, which assumed the superiority of one race over another, were to be universally discouraged. One speaker, with a measure of agreement from others, asserted that even so, it would inevitably be a long time before the mass of men could be linked to an old tradition of aristocratic culture.

What part can national and international institutions play in a "new humanism"?

Humanism of some kind was a basic element in all true education, providing a counter-weight to excessive technology in the West, and in the East fortifying an outlook that might become unduly vague and other-worldly. Educational institutions

both in East and West, and international organizations could play an important part in this matter. The East might supply the new "classics" that were required for the new humanism.

The value of patriotism and the danger of nationalism

There was general concurrence in stressing the evil of aggressive nationalism; but even humanism must begin by being what one speaker called "patriotic humanism." The young must begin with their own country and their own language. It was a contemptuous attitude to other peoples rather than a pride in one's own that was injurious.

Tolerance

While recognizing tolerance as a virtue which the world still needed to learn, the conference was alive to the dangers of a tolerance which was hardly to be distinguished from apathy: tolerance with conviction, and without condescension, was the only effective kind.

Time and Eternity

On this topic, members really were divided, and it is not a question on which to base anything to be called a conclusion. To the Western mind, time was a reality and history a study of basic importance. To some Eastern thinkers, though not to all, time was an unreality, and hence history was a subject of little importance, although this did not represent the views of Islam, which had produced notable historians.

The importance of a philosophy of human labor

Members were in agreement with one speaker that work today, owing to technical devices, was losing its old respected place in man's life. To rediscover an ethic of work was a primary task for philosophers today.

The education of the full human being and the training of the specialist

After full and varied discussion, the conference agreed that while specialists were more than ever necessary in the modern world, a specialized training was often no education at all. Specialists and non-specialists alike should study the humanities as part of their full education as men: in particular, philosophy should be imparted in lectures and classes (preferably not for examination) to all students of science. The philosopher could learn from the scientist, but could also show the scientist the limits of the scientific field.

These views represent some conclusions of the symposium irrespective of the difference between East and West. On that particular subject the conference was broadly agreed that:

(1) The difference had been over-emphasized in popular thought.

(2) "The East" was by no means synonymous with India.

(3) Certain differences due to geography, climate, etc., must always remain and could not be changed.

(4) Even so, the typical *attitudes* of Eastern and Western man were products of evolution and in the process of time could be modified by cultural contacts.

(5) Such contacts were now possible on a scale unknown before, and should be encouraged by every means available.

(6) Finally, we might take hope from the reflection that wars and world conflicts had not arisen from differences of civilization such as are represented by East and West, but between the uncivilized and fanatical minorities within a single civilization. It was to eliminate such uncivilized minorities by means of education that East and West might co-operate.

RECOMMENDATIONS

(1) That contact between East and West should be encouraged by a series of conferences held both in Eastern and Western centers, to be attended by groups representing philosophy, science, arts, and education.

(2) That suitable textbooks should be written for use in schools and universities, both in East and West, giving an account of the teaching of the "prophets" and leaders of religious and philosophical thought. In this connection the conference noted with satisfaction the attempt made by leading educationists, especially the British, for the study of the ethical, philosophical and religious classics of the world. (The document on the subject was circulated to the members of the conference by the courtesy of the chairman.)

(3) That the "classics" of the East should be better known in the West than they are at present and that to this end Unesco should establish a committee to choose such "classics" and to supervise their publication.

(4) That the teaching of science should at all stages be more closely associated with the teaching of philosophy.

(5) That education, especially in its early stages, should give more scope to development of the imagination and aesthetic sensibilities of children.

(6) That history, as taught in schools, should be reorientated away from a nationalist outlook, and that the publication of historical textbooks should be supervised by joint committees representing different nationalities.

(7) That the work already undertaken by Unesco in the educational field, such as providing information on different national types of education and establishing a panel of experts available for advice on the subject, should be further encouraged.

The following participated in the discussions:

Mr. Albert Béguin (Switzerland), Writer, Editor of the review "Esprit;" Professor John Traill Christie (United Kingdom), Principal of Jesus College, Oxford; Professor Clarence Faust (United States of America), Dean of the Faculty of Humanities, Stanford University, Stanford, President of the Fund for the Advancement of Education established by the Ford Foundation; Dr. Helmuth von Glasenapp (Germany), Professor of Indian Civilization at the University of Tübingen; Professor Yensho Kanakura (Japan), Professor of Indian Civilization at the University of Tohoku; Senator Ibrahim Madkour (Egypt), Member of the Egyptian Senate, Member of the Fuad I Academy of the Arabic Language, Emeritus Professor of Philosophy at the University of Cairo; Professor Giuseppe Pisanelli (Italy), Member of the Italian Chamber of Deputies, Professor of Philosophy at the University of Rome; Mr. André Rousseaux (France), Writer; Mr. Jacques Rueff (President of the International Council for Philosophy and Humanistic Studies), Member of the "Institut de France"; Sir Sarvepalli Radhakrishnan (India), Indian Ambassador to Moscow, formerly Chairman of the Executive Board of Unesco; Professor G. P. Malalasekera (Ceylon), Professor of Philosophy at the University of Colombo; Professor Hilmi Zipa Ulken (Turkey), Professor of Philosophy at the University of Istanbul.

The Government of India, as the host country, also invited the following thinkers to take part in the discussions:

Professor Ras Vihary Das, Professor of Philosophy at the University of Saugar; Dr. Humayun Kabir, Adviser to the Ministry of Education, Emeritus Professor of Philosophy; Professor A. R. Wadia, Pro-Vice-Chancellor of the University of Baroda, Chairman of the Executive Committee of the Indian Philosophical Congress.

Dr. Gunther Patzig, a young German philosopher holding a Unesco fellowship, attended as an observer. Twenty-four other observers from various Indian universities were also present.

H. E. Sir Sarvepalli Radhakrishnan was elected chairman, Senator Ibrahim Madkour and Mr. Jacques Rueff, vice-chairmen, and Professor Christie, rapporteur.

The Director-General of Unesco was represented by Mr. Jean Thomas, Director, Department of Cultural Activities. Mr. Jacques Havet and Mr. Krishna Kripalani, both of the Philosophy and Humanistic Studies Division, were also present at the meeting.

Before the opening of the discussions, a ceremony was held during which a wreath was laid at the Mahatma Gandhi memorial.

The public and the press were admitted, by invitation, to the formal opening and closing meetings, at which H.E. Dr. Maulana Azad, the Indian Minister of Education, took the chair.

H.E. Mr. Nehru, the Prime Minister of India, attended the closing meeting, at which he delivered an address.

REVIEWS

THE LONG-NEEDED VADE MECUM

The College and the Community, by Baker Brownell (Harpers, New York, 1952, 241 pages and index $3.50), is likely to become a pivot on which American higher education will turn. It should be an educational best seller, and if circumstances are favorable, it may reach a large public of young parents, parent-teacher groups, and thousands of frustrated educators. The publisher has something important for the country. If Harpers will push this book, they will be amply repaid, and in more than dollars.

The writer is a senior educational adviser, and a professor of philosophy (at Northwestern University) who has for years seen conceptual and cultural education as the basic solution of our problems. In this volume he speaks out candidly and constructively. We share the opening page with our readers. College teachers may wince, but they should delight at a sharpness which promises — and is actually sustained in the book — to push to the heart of the matter:

"The failures of higher education in America have become the concern of millions of people who a few decades ago would have been indifferent. Theoretically at least, the college is no longer the privilege only of the few; it has become a great public service, costly to the nation, highly advertised. When it fails to make good on its pretensions to cultural and intellectual leadership, there is bound to be trouble. Some of that trouble is here now. Times are difficult, the ground is hot, and we find ourselves less able than formerly to afford the luxuries of educational incompetence, purposeless routine, and sheltered, semiparasitic club life of faculty and students. I refer to the so-called colleges of liberal arts, 'general' education, the 'humanities.' Though professional education also has its faults, they are not the faults of desuetude and laziness.

"The chorus of critics of higher education, however, is ill-assorted. Their voices range all the way from John Dewey, master American in the field, or Robert Hutchins, sincere, powerful, and wrong, down to a congeries of busy fixers bent on rearranging the pieces of the old system into new patterns. This administrative obsession with rearrangement is by far the most characteristic of the modern efforts to make higher educa-

tion better. New curricular patterns are designed to satisfy the need for progress, at least in the catalog, and still disturb as little as possible the routines of those who have lived twenty years or so in the old ones. Old courses are boiled down, joined with other boiled-down courses, and given bright new names such as General Humanities A, or Man and the World I. Squads of teachers are hacks easily spared from their departmental duties and easily orchestrated into the hurried compulsions of the score or outline of the course. This is called a general course, and all freshmen, or sophomores, or juniors, or seniors, are compelled to take it."

The writer's central thesis is implied in the book's title. He makes clear the need for, and the obstacles impeding, integration. The analysis forms the first part of the volume, and the chapters run: the college — a report of a failure; the college and the community; three corrupting principles of college life; technology and the human limit; will science commit suicide?; are engineers educated?; the value of the humanities; education in the human community; what is decadence? the dangers of literacy; the artist and the community; and contacts and communication.

In Part Two Professor Brownell provides his prescription: "the positive university; reconstruction in higher education; the curriculum, the community, and the integration of college work; the council on the future; the house of masters; mobile colleges; and education in little places. The first seventy pages here are concerned with integration, as such, and the problem attendant. Professor Brownell reviews shrewdly, compactly, and hopefully a goodly variety of specific courses intending integration. He here singles out by name the Foundation for Integrated Education as being almost alone in attacking the central problem, thus defined (on pages 185-186): "Educational integration nevertheless should have range enough, I think, to reach across the main fields of human interest and attempt a synthesis. The modern provisionalistic conceptions in science, for example, have their counterparts in morals, the arts, in religion, in social theory. Surely the recognition of these common patterns and the cultural coordination of them have meaning in the comprehension of the modern world! But relatively little study — except for an isolated effort such as the recently organized Foundation for Integrated Education —has been made of them. There is a point where isolative research breaks down. It becomes disintegrative. The division between physics and chemistry is now an arbitrary line across which workers step at will. Once the two required different skills and different ways of thinking. Today the two require each other and progress in either one as a segregated field is less easy. In the same way the lines between biology and organic and inorganic chemistry, between physics and astronomy, geology and anthropology, applied science and sociology, between technology and the arts and philosophy, are no longer controlling limitations in the organization of intellectual life. As these departments of knowledge in the past have emerged one by one from a kind of primitive philosophy, so after a period of self-definition and segregation they are returning to a kind of philosophy in which they must find integrity once more as aspects of a general pattern. Of themselves they are fragments whose main significance is in their participation in the whole living situation. If a college must have departments, then the departments of philosophy, it would seem, should be the focus of the intellectual synthesis. But departments of philosophy also fail in this. The departmental system, indeed, makes for departmental thinking, and the philosophers are no exception."

Experience indicates that if one of the great funding foundations were to put in the hands of a group of the colleges and people favorably mentioned in this volume a moderately large sum to be spent in solving the problem it fully describes, that foundation would do more good, at one stroke, than can be done by any amount of scattered expenditure on education. The curious fact is that large grants-in-aid are made to enable *individual* persons and colleges to nibble at this problem, and large grants made to *groups* to re-work the machinery of education, but have adequate grants been made to any group to solve the integrative problem? The need has been known for years. The country and the world desperately require this work done. The people, the materials, and the program are available. What are we waiting for? F.L.K.

THE SHAPES OF THINGS TO COME

Since 1900 a general neglect of the subject of morphology has been long evident. The rediscovery, in that year, of Gregor Mendel's studies of the morphogenesis of the sweet pea was a turning point from the inconsistent randomness-mechanism of the 19th century; but for years — except for *Design in Nature,* J. B. Pettigrew (Longmans, London, 1908, three volumes) and *The Curves of Life,* Theodore Cook (Constable, London, 1914), Darwin's *Challenger* Monograph, and Haeckel's *Kunstform der Natur* — only D'Arcy W. Thompson's book, *Of Growth and Form* (Macmillan, 1917) and F. M. Jaeger's well known *Lectures on the Principle of Symmetry* (also 1917) were available to document in adequate style the formal results of the challenging new fact: the microcosmic world is wholly ordered, and a dynamic internal cell geometry governs development. The Thompson book sold out, yet twenty-five years elapsed before it appeared in a second edition. All these fifty years the mathematics of organization received inadequate study.

Now, at last, the too long neglect of symmetry and proportion and the deductive mathematical properties of organisms is coming to an end. We have before us three important works in this domain, another volume reviewing the nature of organization, and a basic study of the relation of the second law of thermodynamics to organic evolution.

It will be quite impossible to do justice to the three books on symmetry. Let it be said, therefore, at the start, that if the student has these books noticed below, and Thompson and Jaeger and earlier works listed above, and Andreas Speiser's *Theorie der Gruppen von endlicher Ordnung* (e. Aufl. Berlin, 1937) and Jacque Nicolle's *La symetrie et ses applications* (Paris, Albin Michel, 1950), he will have what counts. (There is, of course, also a considerable literature in aesthetic measure: Hambidge, Ghyka, Birkhoff, Bragdon, in an adjacent field, and a few key monographs, such as A. H. Church's *Relation of Phyllotaxis to Mechanical Law;* applying mathematics to morphology.)

Symmetry (Princeton University Press, 1952, 159 pages and index, superbly illustrated, $3.75) is now added by Hermann Weyl to his *Philosophy of Mathematics and Natural Science* (also Princeton University Press, $5). It is his "swan song on the eve of . . . retirement from the Institute of Advanced Study" (to his home in Zurich). The four lectures discuss bilateral symmetry; translatory, rotational, and related symmetries, ornamental symmetry, and crystals (the general mathematical idea of symmetry); and the appendices are devoted to finite groups of rotations in 3-space and inclusion of improper rotations. (An illustration from Haeckel's *Challenger monograph,* printed on page 75 of *Symmetry,* appears on the cover of this issue.)

Morphogenesis (J. T. Bonner, Princeton University Press, 1952, 290 pages, and index, admirably illustrated, and 13 pages of bibliography, $5) attacks the problem of the relation of adult forms to their microcosmic origins, mostly in terms of a chemico-physical assumption, although the book is explicitly *not* a reduction to such terms. The author's words can serve as notice:

"There is little doubt that ultimately the only way of finding a solution to the riddle of development will be to discover new and penetrating facts. Biologists are empirical, experimental scientists, and this course is unquestionably the right one. But empirical work is a little bit like prospecting for gold; we may become, by a combination of hard work and a few other gifts, able prospectors, but gold is hard to find. There is, however, some value in taking a general glance at the whole subject, if for no other reason than to guide the tenor of future experiments.

"One of the prime concerns of a science, and our concern here, is what constitutes an explanation. When we say, for instance, that problems of development are unsolved, we mean that they are unexplained. Exactly what explanations consist of is a profound problem considered in great detail by many philosophers[1] and here I shall mention only a few points. It is obvious that an explanation involves the relating of facts, or generalizations from facts. One may know, as Mendeleev did, that the elements have certain properties that recur periodically. This generalization is in no way explanatory. But when later it was discovered that the electrons surrounded the nucleus in shells, and that the number of electrons in the outer shell correlated with the periodic properties, then the periodic table was felt to be explained. Here then two generalizations were related: the number of electrons in the outer shell of an element and its periodic properties. Not all related generalizations give satisfactory explanations, for if one has a correlation and no understanding of the relation, then the phenomena are still unexplained. This situation arises only too frequently in biology where we have statistical correlations, but no understanding of why such correlations should exist.

"Hempel and Oppenheim (1948, p. 147) make an important point about the type of explanation that apparently is especially satisfactory to the human mind. They say that the most appealing type 'consists of explaining a class of phenomena by means of a theory concerning their micro-structure.' And later they say it is often felt that only the discovery of a micro-theory affords real scientific understanding of any type of phenomenon, because only it gives us insight into the inner mechanism of the phenomenon, so to speak. The example of the periodic table which I have just given is an excellent illustration of this point, for we have more satisfactorily explained the periodic properties when they are expressed in terms of the micro-structure of the elements. And when T. H. Morgan left regeneration we might say he did so because he was unable to devise a micro-theory, and just this is what he did so successfully in the gene theory of heredity.

"For a biologist, a micro-theory would ultimately bring him to physics and chemistry, and back to the old question of whether or not we are to explain biological phenomena in terms of physics and chemistry. The frequently proposed reply is that this is so, but that we must not expect the answer necessarily to be found in the physics and chemistry of today, in that those fields may have to be enlarged to encompass all theories involving living organisms. It is perhaps easier to say, with Hempel and Oppenheim, that our explanation will be especially satisfactory if it is expressed in term of a micro-structure theory. Moreover, it is quite possible, and often the case, that a biological explanation is not reduced all the way to physics and chemistry, but that some intermediate micro-theory is quite satisfactory. After all, 'micro' is used here in a relative sense, and provided the explanation involves units smaller than the phenomenon which is explained, we will have a micro-theory. In the gene theory, as conceived by Morgan and others, the genes were merely some sort of unspecified units, and numerous attempts including recent ones have been made to identify the physico-chemical nature of these units" (pages 3-5).

"The protoplasm in its growth, and perhaps to a large extent in its movement, ignores everything but the final shape of the whole mushroom. But the protoplasm is not continuous, as it is in the plasmodium of the Myxomycetes; it is separated into threads, yet they act as a whole. There must be some factor which transcends the cell wall and unifies this cottony mass, but what this factor or factors might be is another matter. Already in this book we have come to a deep-rooted sign of the least understood problem of the control of development, for it is the explanation of this sort of phenomenon that makes us say that growth and development is a problem. Really it is many problems; but this one, the unification of a great mass of protoplasm into a oneness, a wholeness, has us more mystified than all the others" (page 100).

Professor Bonner returns to this problem of the field and its chemico-vital processes in development, in his seventh chapter. His admirable review, as a whole, turns the topic back to the mathematicians, for the factors are so many that only *that* level of macrocosmic order permits us to generalize.

Aspects of Form, edited by L. L. Whyte (Pellegrini & Cudahy, New York, 1951, 222 pages, $6) is a discursive work of much value. The authors and topics are as follows:

Herbert Read: Preface; Lancelot Law Whyte: Introduction, Chronological Survey on Form, and Bibliography on Form; S. P. F. Humphreys-Owen: Physical Principles Underlying Inorganic Form; C. C. L. Gregory: Shape and Distance Considered by an Astronomer; C. H. Waddington: The Character of Biological Form; F. G. Gregory: Form in Plants; Joseph Needham: Biochemical

[1] J. H. Woodger (1929) does this specifically for biological problems.

Aspects of Form and Growth; Albert M. Dalcq: Form and Modern Embryology; Hugh B. Cott: Animal Form in Relation to Appearance; Konrad Z. Lorenz: The Role of Gestalt Perception in Animal and Human Behavior; W. Grey Walter: Activity Patterns in the Human Brain; Rudolf Arnheim: Gestalt Psychology and Artistic Form; E. H. Gombrich: Mediations on a Hobby Horse, or the Roots of Artistic Form.

It is surprising that a book such as this is issued without an index. The editor provides, however, an interesting, sketchy, chronological sequence of studies of form from about 4,000 B.C. down to quanta and an admirable bibliography.

Problems of Life (John Wiley, New York, 1952, 204 pages and indices, $4) is the author's own translation of Ludwig von Bertalanffy's *Das Biologische Weltbild*. The work constitutes a priceless review of the present position of the organismic concept. We shall serve the reader best by quoting from pages 157-8. The student will want to run on to the end of the book for himself, after finding out what precedes these cogent words:

"Now the second question arises, namely, whether biological laws can ultimately be reduced to the laws of physics. The evolution of physics tends towards an ever more comprehensive unification which, though by no means finished, in principle lets us expect that the entire physical world can be constructed from a few ultimate elements and basic laws. From a small number of physical constants, such as Planck's quantum, the masses of the proton and electron, light velocity, etc., together with the pertinent fundamental laws, first the structure of the atoms and the periodic system of the elements can be derived, from these again the multiplicity of chemical compounds, the crystals, the rigid bodies, etc., up to planetary systems and galaxies. It can hardly be doubted that a fusion of the realms of physical and biological laws will ultimately be achieved. For from the standpoint of logics of science, the synthesis of previously separate fields in a general trend, and, on the other hand, from the empirical standpoint the realms of the sub-microscopic morphology, of viruses, etc., form a connecting link between inanimate and living nature. This basic postulate, however, does not obviate the necessity of first establishing the laws of the biological levels as such. On the other hand, it is possible, and even demonstrated to some extent, that the very inclusion of biological problems and fields leads to an expansion of the system of concepts and laws of physics. Remember the generalization of thermodynamics in the theory of open systems, which seems to contradict principles of the physical world hitherto regarded as fundamental, such as that of the tendency to maximum disorder. This is the more remarkable since thermodynamics seemed to be a consummate field of classical physics. Therefore, only the evolution of science itself will show in what way a synthesis can be achieved.

"Number and measure govern mathematical physics, and pointer readings are its ultimate basis. In biology also the statement of quantitative laws is an important task, and we see that such laws can be found even in fields like that of organic forms. However, it appears that there is a range of specific biological problems, for the treatment of which the mathematical tools are yet to be created. Many of the most essential questions of biology are not a matter of quantities but of pattern, position, and shape" (page 157).

Time's Arrow and Evolution, by Harold F. Blum (Princeton University Press, 1951, 218 pages and index, soundly illustrated, $4) examines the vexing question of order and entropy. As a review of this problem we have here a valuable handbook. The first eleven chapters are: perspectives; the chronology of evolution; the energetics and kinetics of chemical reaction; the origin and early evolution of the earth; later history of the earth; the fitness of the environment; the energetics and kinetics of living systems; structure and its reproduction; stability and variability; the origin of life; and irreversibility and direction in evolution.

As the discussion is conducted without reference to the place of the space-time continuum in present thought about morphogenesis, the concluding chapter, "Some Implications," has unfortunate limiting assumptions. There is, in this respect, a sharp contrast between this fine study and the works reviewed above. We shall have a richer return from science when the philosopher does his duty and that will only be when the individual's education makes a philosopher out of him, no matter what his specialty may be.

DEEPER INSIGHTS INTO THE BIBLE

The Bible, which has been translated into 1068 languages, has had a deeper influence upon human development than any book ever conceived. Its stories reach back to the dawn of mankind, and many of the parallelisms indicate close contact with rich cultures of the ancient Orient. Dr. Werner Wolff, author of *Changing Concepts of the Bible, A Psychological Analysis of its Words, Symbols and Beliefs* (Hermitage Press, New York, 1951, 395 pp., appendices, bibliography, and index), aware that ". . . the translators . . . took that meaning (for each word) which best fitted into the thought pattern of their own time, thus transforming the ancient concepts," has been at pains to make extensive research into ancient texts to restore the thoughts of the original writers of the Bible.

In reconstructing the long-forgotten and hidden meanings, Dr. Wolff presents here an exciting and rewarding first volume of a proposed trilogy to be entitled *Symbolism in the Bible*. The present volume, which is devoted to an analysis of the story of the world's creation as told in Genesis 1:1, is both a remarkable example of scholarship and a much-needed fresh viewpoint from which layman and theologian, historian, anthropologist, and psychologist can re-appraise this "expression of a philosophy which is equal if not superior to the wisdom literature of the ancient Orient."

In earlier times the world was one — an integrated system in which man could and did trust and in which ancient civilizations *lived*. In recent centuries this synthesis has been lost and, with it, the values once given to life and to culture. This demonstration of the integrative power of a philosophy should have meaning to us now.

The ancient words and symbols are put under psychological, semantic, and anthropological analysis and the pattern of the thought processes of the authors is revealed by cultural analysis. The result is altogether arresting in that many of our current religious beliefs are shown to be probable misconceptions of the inte-

grated world-view of the original authors. Some will undoubtedly be disturbed to find some of the original concepts to be not what they have supposed. However, every reader should be both stimulated and reassured in being led into plumbing new depths in this much-read but little-appreciated Book. At least it is demonstrated that, however misconstrued and misunderstood it may be, the Bible, which has had the force to change civilizations, is not mere primitive allegory but is in truth a volume of rich wisdom arising from a rich and wonderful culture.

For his work in integrating the insights of many disciplines and bringing them to bear upon this ancient story of creation the author is to be congratulated. We await his two projected volumes which will apply similar techniques to the story of man's fall and the story of man's development.

We might add that the reader of this admirable volume will find in *The Hebraic Tongue Restored,* by Fabre d'Olivet, translated by N. L. Redfield (Putnam, 1821) the connection of *Genesis* with a world-tradition. Such a further step is important if Dr. Wolff's thesis is to be set into its background of what Ananda Coomaraswamy calls the universal tradition. —H.W.C.

KEY IDEAS FOR TEACHING TODAY

This book (*Education and the Nature of Man,* by Earl C. Kelly and Marie I. Rasey, Harpers, 1952, 206 pp. and index, $3) asks us to take stock of our present beliefs and methods in education in the light of what in the last fifty years science has shown to be the nature of man.

Is it true that learning takes place best in the conventional classroom, with an "autocratic" teacher who hands out lessons (mostly facts) to be memorized? Or do these techniques run counter to what is now known about conditions conducive to growth?

The authors have given us a splendid practical handbook of an essentially human approach to education. It consists of three sections:

The first is a concise synthesis of scientific findings about man as a human being grouped under significant key concepts which have emerged from this synthesis. These key ideas challenge some of our most basic assumptions. Our constant striving for security is confronted with the process, the fluidity, the dynamic changeability of our world. Nothing is more certain about ourselves or our environment than that it is constantly changing.

Man himself embodies another dynamic — also a kind of change — which we call growth. Life itself is essentially growth. And in and for his growings man needs other human beings. His long history demonstrates that "man is essentially a social animal, or he is nothing." Cooperation is man's way of working with others for mutual benefit and growth. It is by "doing together" that we approach the "life good to live."

Man is seen as a purposive, self-directing organism, unique both because of his experiences and his physical organism.

In the second part of the book, the authors turn to the educational application of these concepts. Looking at what we know man to be, what kind of education will suit him best?

A salient fact, apparent from their survey and stressed in the book, is that no teacher really teaches, learners only learn. How best to promote learning is the problem.

Educational content should not consist of mere absorption of facts, arbitrarily handed out by a teacher; of a one way method of communication. What is needed is to keep the learner involved through mutual exchange of knowledge richly related to life itself. The learner's basic curiosity should be kept alive by showing him how what he learns can help him enjoy, utilize, and understand himself, others, and his environment. Under such headings as "Freedom" and "Creativity" suggestions are made for developing beings who think for themselves creatively because their innate courage and desire to learn has not been killed by repressive methods and who have learned that working with others is socially satisfying.

The book is written in a simple, lucid, enjoyable style. The last part is composed of source material, i.e., quotations from experts and others upon which much of the content is based. These are keyed to pertinent paragraphs in earlier sections. The extracts present tantilizing question marks, cogent ideas, and, in some cases, vistas of real beauty.

Perhaps the central idea and feel of the book can best be expressed in these paragraphs which close it:

"The realization of a workable relationship among the peoples of the world is now in the idea stage. Its progress will depend much upon our schools as the prime agents of learning. The idea is supported both by the great teachers of the past, and by the science of the present. It is further supported by great need, as shown by the present condition of a war-torn, inhuman world.

". . . We have optimism — it being inherent in purposive organisms. We do not believe that the ultimate destruction or degeneration of mankind will occur. We think that the freedom of man can and will be achieved.

"We now have the tools with which to work. We have a great institution suited to the task. . . . We have knowings which we did not have before, and a readiness on the part of people which has been acquired at enormous cost. We are ready now for the first time to reach out and grasp civilization." — *Margaret H. Wagner*

A NEW EDUCATIONAL JOURNAL

The *Journal of Human Relations,* Vol. I, Number 1, appeared in June of this year, and will be issued regularly at Central State College, Wilberforce, Ohio, in November, February, and Spring, under the editorship of a Board: Anne O'H. Williamson, chairman; John C. Alston, Mollie E. Dunlap, Clara A. Henderson, Clinton F. Oliver, and Ralph Templin. The rate is $3 a year.

The initial number, of 80 pages, devotes its very first article to integration: "The Chief Aim of Education," by Daniel A. Brooks. Dr. Brooks writes from a background of years as an administrator in the Philadelphia Public School System, but the material he offers will challenge and may assist teachers at graduate levels in schools of education.

The balance of this issue sustains this remarkable level of immediacy, scholarship, and humanity. This journal should have a sensational success, and it is certain to flourish if its initial style and content are maintained.